

U.S. Department of the Interior National Park Service

**Environmental Assessment/Assessment of Effect for Replacement of Jim Camp Wash
Bridge and Associated Site Improvements**

Petrified Forest National Park Rainbow Forest Area Navajo County, Arizona

Summary

In the Rainbow Forest area of Petrified Forest National Park, the National Park Service proposes to replace Jim Camp Wash bridge along its historic alignment, widen the highway approach lanes to the replacement bridge to reduce their accident potential, as well as provide a pedestrian walkway on the replacement bridge to reduce vehicle/pedestrian conflicts and safety hazards. In addition, the nearby Long Logs road and parking area would be converted to a pedestrian trail.

The environmental assessment examines in detail two alternatives: no action and the preferred alternative. The preferred alternative would have no impacts to the park's geology; water resources; threatened, endangered, candidate species or species of special concern; prime and unique farmlands; or environmental justice. There would be short-term, negligible to minor adverse impacts to soils, air quality, biotic communities, and the park's socioeconomic environment.

Replacing Jim Camp Wash bridge and converting Long Logs road and parking area into a foot trail would adversely affect the Rainbow Forest Historic Landscape, a historic property considered eligible to be listed in the National Register of Historic Places. However, visitor safety would be enhanced by the preferred alternative, and eliminating vehicular access to Long Logs would reduce the theft of the park's primary, nonrenewable resource -petrified wood -from the area. Eliminating vehicular access to Long Logs for the protection of petrified wood is part of the preferred alternative from the park's General Management Plan/Development Concept Plans/Environmental Impact Statement (1992).

Note to Reviewers and Respondents

If you wish to comment on the environmental assessment, you may mail comments to the name and address below. Our practice is to make comments, including names and home addresses of respondents, available for public review during regular business hours. Individual respondents may request that we withhold their home address from the record, which we will honor to the extent allowable by law. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

Please Address Comments to:
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Petrified Forest, AZ 86028

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PURPOSE and NEED

PURPOSE

Petrified Forest National Monument was created in 1906 to preserve and protect fossils and concentrations of petrified wood that date to the late Triassic period, over 200 million years ago. Sites throughout the park also tell of human history in the area for more than 8,000 years, revealing a cultural transition from wandering families to settled agricultural villages (pueblos).

In the late 1920s a trading post was established near the Rainbow Forest at what was then the National Park Service headquarters for the monument. An inn had also been built on the Painted Desert rim at Kachina Point, which was then some distance north of the monument. In 1932 the National Park Service acquired the Painted Desert, as well as a narrow strip of land to connect the monument's two units.

During the 1930s a number of additional changes also occurred at the monument. A museum and headquarters complex near the Rainbow Forest, which included the Jim Camp Wash bridge, and a new road to join the north and south units of the monument were constructed under "New Deal" era work programs, including the Civilian Conservation Corps (CCC). The CCC and Works Progress Administration rebuilt the Painted Desert Inn, now a National Historic Landmark, and worked on a variety of smaller tasks, including trails, roads, fences, antelope reservoirs, and water and sewer systems. Most of this development is still in use today, augmented by the Painted Desert headquarters/visitor center complex built in the 1960s to serve travelers arriving via 1-40.

Petrified Forest National Monument attained national park status in 1962. During the course of the park's history its boundaries have changed several times, most recently in 1986. Today the park encompasses 93,533 acres in Navajo and Apache counties.

Petrified Forest National Park is globally significant for its exposures of the Chinle Formation's fossils, which preserve evidence of a Triassic period ecosystem dating back more than 200 million years. The park's detailed paleontological and stratigraphic records provide outstanding opportunities to study changes in organisms and their environments in order to better understand today's environment.

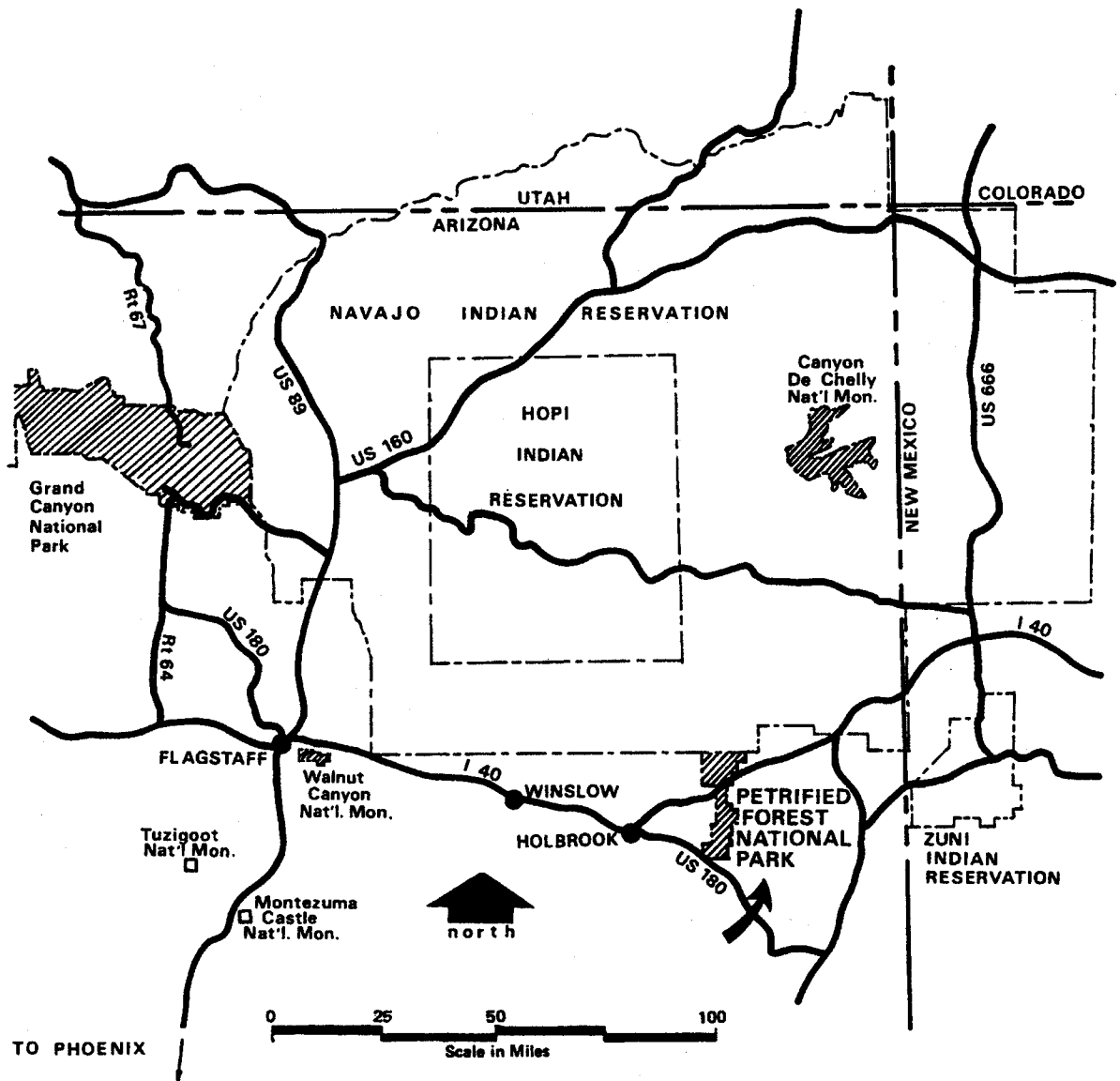
As stated in the *Strategic Plan for Petrified Forest National Park, October 1, 2000-September 30, 2005*, the purpose of the park is to

- . preserve and protect the petrified forest, its outstanding paleontological sites and specimens, its associated ecosystems, cultural and historical resources, and scenic and wilderness values for present and future generations;
- . provide opportunities to experience, understand and enjoy the Petrified Forest and surrounding area in a manner that is compatible with the preservation of the park's resources and wilderness character;
- . facilitate orderly, regulated and continuing research
- . promote understanding and stewardship of resources and park values by providing educational opportunities for students, scientific groups and the public.

The proposed action would occur in the park's Rainbow Forest area, in Navajo County. The developed area at Rainbow Forest consists of a visitor center/museum, concession building, a housing complex and associated outbuildings, parking plaza and access road, picnic area, connecting walks, planting islands, Giant Log trails, and Jim Camp Wash bridge. Nearby are the Long Logs road, trails, and parking area.

Petrified Forest National Park averages over 600,000 visitors per year. About 35% of the park's visitors enter the park from the south, many stopping at the Rainbow Forest visitor center/museum for orientation

and information. Visitors entering the park from the south via US-180 must cross Jim Camp Wash bridge via the main park road to access the rest of the linear park, including Long Logs, the Puerco River watershed, and the Painted Desert. Conversely, visitors entering the park from the north and traveling south through the park must cross Jim Camp Wash bridge to access the visitor center/museum at Rainbow Forest, as well as exit the park to the south. For travelers the efficiency of being able to travel through the park and make the connection between Interstate-40 and US-180 is an incentive to invest the additional time necessary to visit this special place.



The Region

NEED

At Petrified Forest National Park the National Park Service proposes to replace Jim Camp Wash bridge, widen the highway approach lanes and bridge to reduce accident potential, as well as provide a pedestrian walkway on the replacement bridge to reduce potential vehicle/pedestrian conflicts and safety hazards.

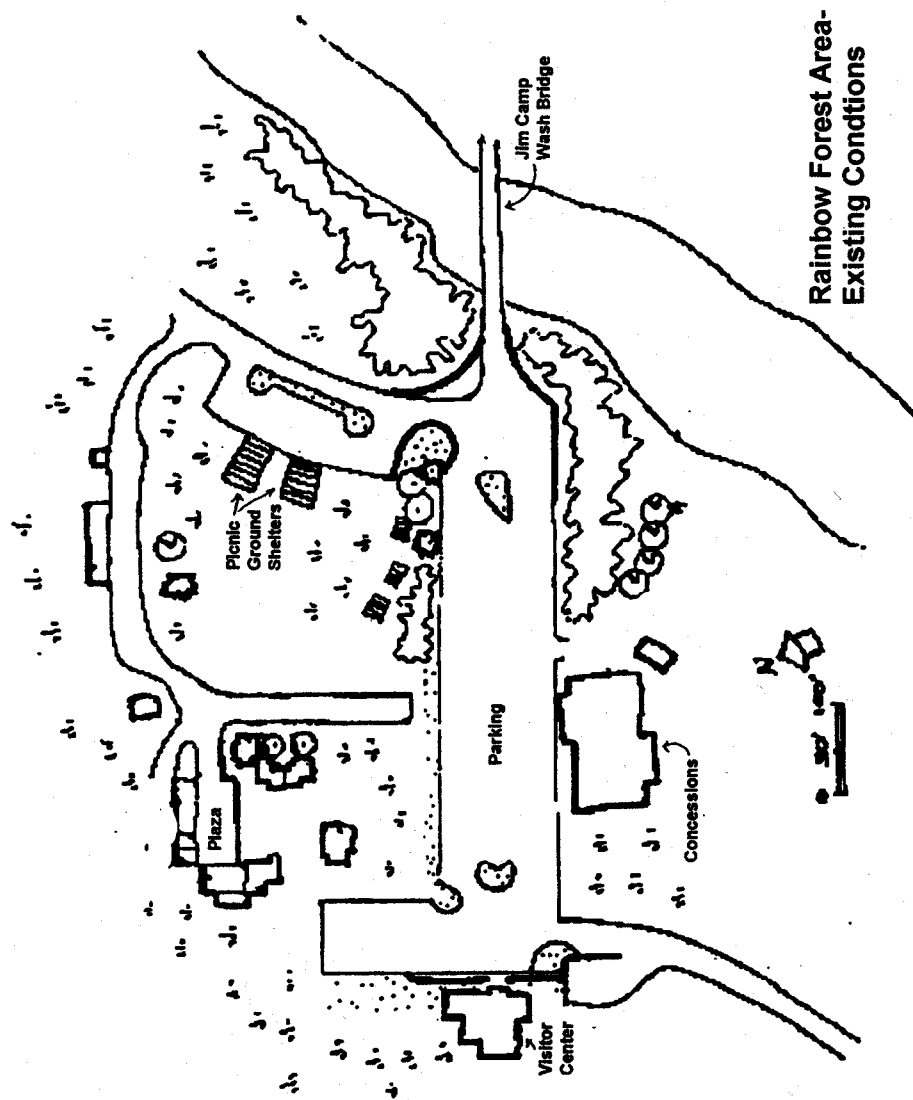
Jim Camp Wash bridge, which was constructed in 1934, is a multi-barreled, concrete, box culvert structure on the main park road, in the southern end of the park. The bridge is at risk of being washed-out due to inadequate freeboard and insufficient capacity for design flow. The bridge's multi-barreled, box construction interrupts stream dynamics by constricting the flow of water, which prevents the efficient transport of a sediment laden flow (mix of sand and water) during a flood event. The flow restriction created by the bridge's box configuration also causes erosive backwater, which threatens stream bank stability. In addition, the bridge's design allows blowing sand to continually fill-in the structure's barrels, or openings beneath the bridge, as well as cover the structure's roadway and markings. Because the bridge is on the main park road, if the bridge were washed-out during a flood there would be no means of traversing the linear park. Visitors at either end of Petrified Forest National Park would be required to make a circuitous 45-mile trip outside of the park in order to visit the opposite end of the park.

In addition, Jim Camp Wash bridge and the highway approach lanes are inadequate in size to accommodate present day vehicles, especially today's larger recreation vehicles and trailers. The clearance between vehicles is a major safety hazard due to insufficient lane width. Both the approach guardrails and the bridge railings are also unsafe and do not meet American Association of State Highway and Transportation Officials (AASHTO) standards. In addition, some visitors access the Long Logs area to the east by walking across Jim Camp Wash bridge, which has no sidewalks, shoulders, or barriers to separate vehicular and pedestrian traffic and is too narrow (24-feet) to safely accommodate both. The concurrent use of the bridge by both vehicles and pedestrians creates a potentially unsafe condition for pedestrians.

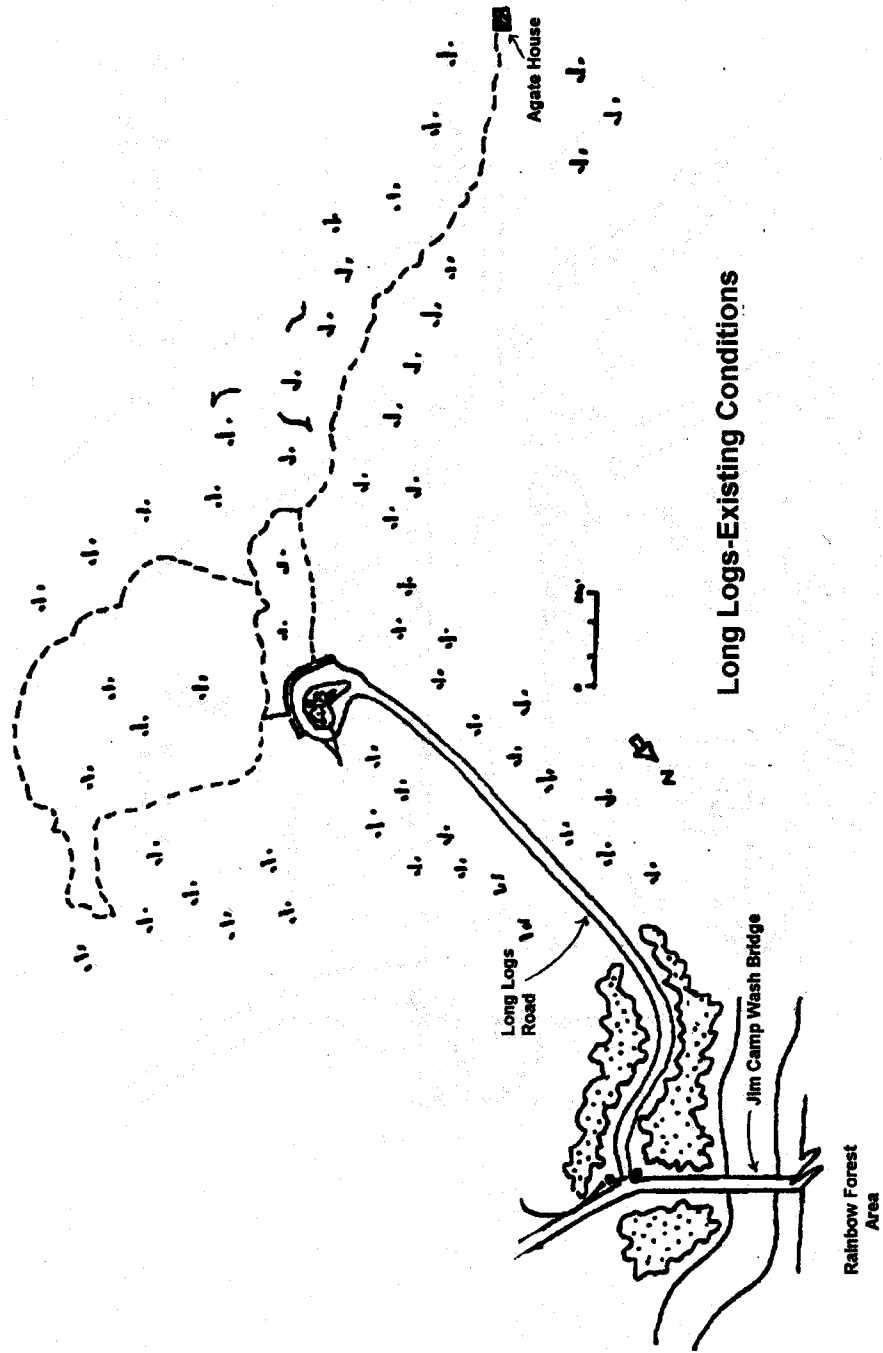
In addition to replacing Jim Camp Wash bridge, a 12-foot wide pedestrian trail would be saw cut from the existing 24-foot wide asphalt surface of Long Logs road and parking area, allowing the trail to follow the route of the former roadbed. The remaining asphalt would be obliterated and removed, and the former roadbed would be retained and revegetated with native species to restore its natural appearance. The 12foot wide asphalt trail to Long Logs would reduce potential vehicle/pedestrian safety hazards, providing safer access for hikers to Long Logs, and access by the mobility impaired, as well as emergency vehicle access. The opportunity for a longer hike would be a benefit to visitor seeking such experiences.

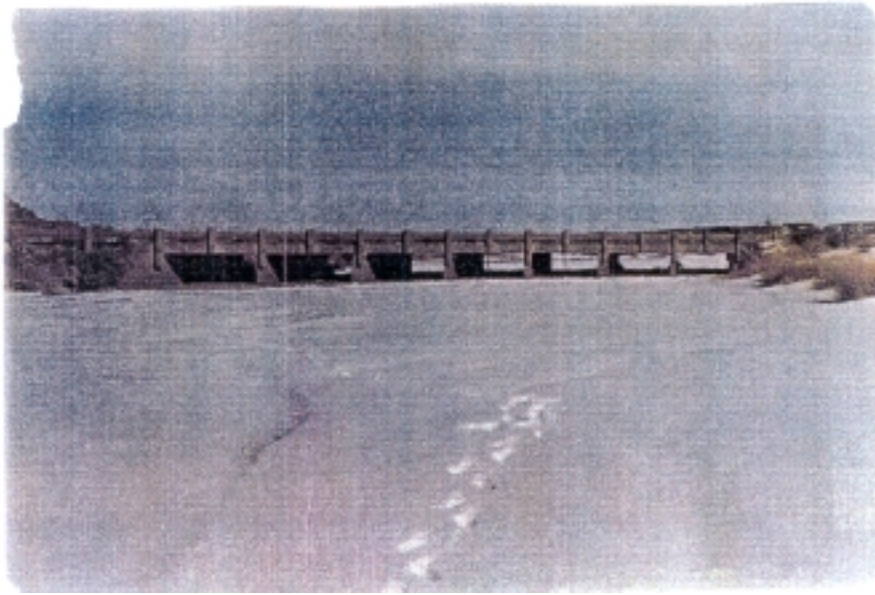
Eliminating vehicular access to Long Logs would also reduce the theft of petrified wood from the area. A study of petrified wood theft by the Virginia Poly technical Institute (1997) demonstrated that petrified wood sites that are accessible by vehicle or are in view of a parking area are especially prone to theft. Petrified wood losses throughout the park continue, despite the park's interpretive and resource protection emphasis on leaving the petrified wood, a non-renewable resource, on the ground.

Vehicular access of Long Logs is currently permitted daily during park operating hours. The parking area at Long Logs is sited adjacent to a high concentration of petrified wood. Current park staffing makes it impossible for the park to have a uniformed presence at Long Logs for surveillance during operating hours each day, to prevent the theft of petrified wood. Controlling access to the site by eliminating Long Logs road, however, would result in a reduction of petrified wood theft without increasing the park's staffing requirements.



Rainbow Forest Area-
Existing Conditions





Jim Camp Wash Bridge



Vehicles and Pedestrians Share Jim Camp Wash Bridge

RELATIONSHIP OF THE PROPOSED ACTION TO PREVIOUS PLANNING EFFORTS

The proposed action is consistent with Petrified Forest National Park's establishing legislation, as well as the park's General Management Plan/Development Concept Plans/Environmental Impact Statement (1992) and Comprehensive Interpretive Plan (1999). The general management plan's preferred alternative included elimination of vehicular access to Long Logs for the purpose of protecting the petrified wood at this site and enhancing the visitor experience.

IMPACT TOPICS

Issues and concerns affecting the proposed action were identified by specialists in the National Park Service, as well as from the input of other federal and state agencies. Impact topics are the resources of concern that could be affected by the range of alternatives. Specific impact topics were developed to ensure that alternatives were compared on the basis of the most relevant topics. The following impact topics were identified on the basis of federal laws, regulations, orders, and National Park Service *Management Policies* (2001). A brief rationale for the selection of each impact topic is given below, as well as the rationale for dismissing specific topics from further consideration.

Impact Topics Analyzed in this Environmental Assessment

Geology and Soils: Petrified Forest National Park is in the Puerco River watershed of northeastern Arizona, which is part of the larger Colorado Plateau system. Visual characteristics of the park predominantly include windswept plains, horizontal orientation of rocks, isolated buttes, and barren, usually dry riverbeds and washes. Rolling hills and rock outcroppings surround the relatively flat plains of the project area. The predominant soils in the project area are Jocity sandy clay loam and Clayspring clay. These alkaline soils are friable, with slow to medium runoff and moderately slow permeability . Because the proposed action involves ground disturbing activities, geology and soils will be addressed as an impact topic.

Paleontological Resources: Petrified Forest National Park contains one of the most accessible exposures of Triassic sedimentary deposits in the world. Limited paleontological research in the park began during the 1920s. To date, in addition to the park's abundance of petrified wood, which are remnants of prehistoric *Araucarioxylon*, *Woodworthia*, and *Schilderia* trees, the fossilized remains of about 148 species of plants and 50 species of animals from the Triassic era have been identified.

The petrified wood at the Giant Logs interpretive area, which is about 100-feet west of the Rainbow Forest visitor center/museum, would be neither directly nor indirectly impacted by the proposed action. The petrified wood at Long Logs would not be directly affected by construction associated with the proposed action. However, a study of petrified wood theft by the Virginia Poly technical Institute (1997) demonstrated that petrified wood sites that are accessible by vehicle or are in view of a parking area are especially prone to theft. Petrified wood losses at Long Logs and throughout the park continue, despite the park's interpretive and resource protection emphasis on leaving the petrified wood, a nonrenewable resource, on the ground. Because removal of the Long Logs road would eliminate vehicular access to the area, indirectly impacting the area's petrified wood, paleontological resources will be addressed as an impact topic in this document.

Air Quality: Section 118 of the 1963 Clean Air Act (42 U.S.C. 7401 *et seq.*) requires a park to meet all federal, state, and local air pollution standards. Petrified Forest National Park is designated a Class I air quality area under the Clean Air Act, as amended. A Class I area is subject to the most stringent regulations of any designation. Class I areas must not exceed the maximum allowable increment over baseline concentrations of sulfur dioxide and particulate matter as specified in Section 163 of the Clean Air Act. Further, the Clean Air Act provides that the federal land manager has an affirmative responsibility to protect the park's air quality related values (including visibility , plants, animals, soils, water

quality, cultural resources, and visitor health) from adverse pollution impacts. Thus, air quality will be addressed as an impact topic in this document.

Biotic Communities: The desert shrub association, characterized by sagebrush, rubber rabbitbrush, four wing saltbush and blue gramma grass dominate the project area and its vicinity .Wildlife typically observed in the area include Gunnison's prairie dogs, pronghorn, black-tailed jackrabbits, desert cottontails, and coyotes. Many bird species, such as flycatchers, warblers, and sparrows, migrate through the park in spring and fall, relying on the insects and seeds in the park's desert shrubland and shortgrass prairie to sustain them. Reptiles common to the project area include collared lizards, sagebrush lizards, whiptail lizards, and Hopi rattlesnakes.

The National Environmental Policy Act (1969) calls for an examination of the impacts on all components of affected ecosystems. National Park Service policy is to maintain all the components and processes of naturally evolving park ecosystems, including the natural abundance, diversity , and ecological integrity of plants and animals (National Park Service *Management Policies*, 2001). Therefore, biotic communities will be addressed as an impact topic.

Archeological Resources and Cultural Landscapes: The National Historic Preservation Act, as amended in 1992 (16 USC 470 et seq.), and the National Environmental Policy Act, as well as the National Park Service's Director's Order-28, *Cultural Resource Management Guideline* (1994), *Management Policies* (2001), and Director's Order-12, *Conservation Planning, Environmental Impact Analysis and Decision-making* (2001), require the consideration of impacts on cultural resources listed on or eligible for listing on the National Register of Historic Places. The undertakings described in this document are subject to Section 106 of the National Historic Preservation Act, under the terms of the 1995 Servicewide Programmatic Agreement among the National Park Service, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers. This document will be submitted to the Arizona state historic preservation officer (SHPO) for review and comment.

Archeological Resources: The project area was part of a larger area surveyed for archeological resources by the Western Archeological and Conservation Center, during July 8-17, 1986 and June 17 to August 8, 1995. The Rainbow Forest area was constructed in an area encompassing many chipping stations and much lithic scatter. As a result of the previous construction, however, there are no known archeological resources in the project area. Because construction activities associated with the proposed action would be confined to previously disturbed ground in the developed area of Rainbow Forest, there would be no impacts to known archeological resources in the project area.

During the archeological surveys, two historic archeological sites (one the remnants of a structure and the other a trash scatter) were found outside of the project area. Neither site would be either directly or indirectly impacted by the proposed alternative. The Agate House -a reconstructed prehistoric structure built of petrified wood, which is listed in the National Register of Historic Places -is outside of the project area and would not be directly impacted by the proposed action. Converting Long Logs road into a foot trail, however, would indirectly impact Agate House by reducing the number of visitors to the site. Therefore, archeological resources will be addressed as an impact topic in this document.

Cultural Landscapes: According to the National Park Service's Cultural Resource Management Guideline (DO-28), a cultural landscape is

...a reflection of human adaptation and use of natural resources and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. The character of a cultural landscape is defined both by physical materials, such as roads, buildings, walls, and vegetation, and by use reflecting cultural values and traditions.

Thus, cultural landscapes are the result of the long interaction between people and the land, the influence of human beliefs and actions over time upon the natural landscape. Shaped through time by historical land-use and management practices, as well as politics and property laws, levels of technology, and economic conditions, cultural landscapes provide a living record of an area's past, a visual chronicle of its history. The dynamic nature of modern human life, however, contributes to the continual reshaping of cultural landscapes; making them a good source of information about specific times and places, but at the same time rendering their long-term preservation a challenge.

The Rainbow Forest area, which encompasses the Jim Camp Wash bridge, the parking plaza and access road, the housing complex, museum, concession building and outbuildings, picnic area, connecting walks, planting islands, Giant Log trails; and the Long Logs road, trails, and parking area, is considered eligible to be listed in the National Register of Historic Places as a historic designed landscape. The Rainbow Forest Historic Landscape was planned and designed by the National Park Service and for the most part constructed by the Civilian Conservation Corp (CCC) during the 1930s, and was the first visitor contact area for Petrified Forest National Park. Following is the statement of significance in the National Register nomination form prepared for the Rainbow Forest Historic Landscape:

For thirty-nine years Rainbow Forest served as park headquarters, serving as the gateway for tourists, naturalists, and scientists into the rare and varied landscapes of Petrified Forest National Park. It developed around a resource base that is characterized by its extreme wealth of geological, paleontological, archeological, and biotic features and its extreme dearth of water and shelter. Patterns of development at Rainbow Forest reflect nationally and regionally significant historic trends; early park and CCC era design and planning. ...The Rainbow Forest cultural landscape represents a unique marriage between design philosophy, adaptation to the natural environment, and management concerns. Many characteristics of Rainbow Forest cultural landscape illustrate National Park design principles of the 1920's and 30's. The layout of Rainbow Forest is an example of park village planning, while its vernacular/rustic architecture and small-scale features show a concern both for adapting regional architectural traditions as well as creating a sense of aesthetic unity. At the same time, natural features, topography and climate have influenced site selection and building arrangement and have limited buildable area. In addition, managing for theft reduction [of petrified wood] has dictated both pedestrian circulation and building patterns.

While the Rainbow Forest area has changed over time, including changes made during the National Park Service's Mission 66 era (1956-1966), the overall cultural landscape retains many of its original design characteristics:

- The visitor area at Rainbow Forest was designed with a straight sight line between the museum and the Jim Camp Wash bridge/entry road. The sight line goes from the museum to the flagpole, down the middle of the parking lot, and is aligned with the center line of the bridge.
- Use of naturalistic principles of national park design -rustic design style, use of vernacular materials (particularly stone) on both buildings and landscape elements, and the relatively small scale of the single-story buildings and structures that make up the building complexes. In addition, the placement and arrangement of structures in the Rainbow Forest visitor area, many of which are contributing elements to the National Register eligible cultural landscape (see page 17, Historic Structures and Ethnographic Resources), are important to the overall character of the landscape. Most of the structures were built under "New Deal" era work programs, including the Civilian Conservation Corps (CCC).
- General harmonizing of development with natural setting, with buildings subordinate to the natural topography, and use of primarily native plants adjacent to buildings and in other designed settings.

- The visitor center/museum, residences, and the maintenance buildings are all rustic sandstone structures. They are low and flat roofed, in the southwestern tradition, and the residences are oriented around a central patio, evincing a southwestern theme.
- Public access and visitor use areas (visitor center/museum and concessions) arranged around the main parking area, with housing and other non-visitor use areas in clusters off the main parking area;
- The primary circulation system is substantially intact, although the northern circulation loop to the maintenance area was modified and the original one-way loop circulation through the main parking area was consolidated into a two-lane road during the 1960s;
- Unity between architecture and landscape architecture, through the use of similar materials in buildings and landscape elements (curbing, walks, walls, and portals);

Because the proposed action would directly impact several contributing elements of the National Register eligible Rainbow Forest Historic Landscape, cultural landscapes will be addressed as an impact topic in this environmental assessment.

Visitor Use and Experience: Petrified Forest National Park, a non-destination “drive-through” park, is open year round except Christmas day. The park averages over 600,000 visitors per year, and peak visitation occurs during the months of June, July, and August. A two-lane, paved road, stretching from 1-40 to US-180, conveys visitors through the linear park. The park is a day-use area that has no campgrounds or lodging.

The development at Rainbow Forest includes a combined visitor center and ranger station (historically known as Rainbow Forest Museum), a gift shop, and a 60-seat snack bar. Currently about 25% of all park visitors, or approximately 700 visitors per day during the peak summer months, stop at the Rainbow Forest visitor center/museum. Because replacing the Jim Camp Wash bridge and constructing a new access trail to Long Logs would affect visitor use and experience in the Rainbow Forest area, the topic of visitor use and experience will be addressed as an impact topic.

Park Operations: Most of Petrified Forest National Park’s administrative services and maintenance operations are at the park headquarters in the Painted Desert area. If Jim Camp Wash bridge were not replaced and the bridge were to fail, or there would be an unplanned closure of the bridge, there would be no alternate means of traversing the linear park. Park personnel at either the north or south ends of the park would be required to make about a 45-mile detour to access the opposite end of the park. In addition, the bridge requires increasing maintenance, as well as the regular removal of sand from its roadbed. Therefore, park operations will be addressed as an impact topic.

Socioeconomic Environment: The proposed action would not change local and regional land use. Construction activities associated with the proposed action could minimally impact the socioeconomic environment of nearby Holbrook and Navajo and Apache counties. In addition, the failure or unplanned closure of Jim Camp Wash bridge would impact the concessionaire who operates the gift shop and snack bar, as well as the two businesses, both rock shops, that are directly outside the park’s south entrance. Thus, socioeconomic environment will be addressed as an impact topic.

Impairment of Park Resources or Values: In addition to determining the environmental consequences of the preferred and other alternatives, National Park Service policy (Management Policies, 2001) requires analysis of potential effects to determine whether or not actions would impair park resources.

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adversely impacting park resources and values. However, the laws do give the National Park

Service the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the National Park Service the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource or value may constitute an impairment. An impact would be more likely to constitute an impairment to the extent that it has a major or severe adverse effect upon a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- identified as a goal in the park's general management plan or other relevant NPS planning documents.

Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park. A determination on impairment is made in the Environmental Consequences section for the following impact topics: geology and soils, paleontological resources, air quality, biotic communities, archeological resources, cultural landscape, and visitor use and experience.

Impact Topics Dismissed From Further Analysis

Prime and Unique Farmland: In August, 1980, the Council on Environmental Quality (CEQ) directed that federal agencies must assess the effects of their actions on farmland soils classified by the U.S. Department of Agriculture's Natural Resource Conservation Service as prime or unique. Prime or unique farmland is defined as soil which particularly produces general crops such as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables, and nuts. According to the Arizona Department of Agriculture, the soils predominantly comprising the project area (Jocity sandy clay loam and Clayspring clay) are useful primarily for wildlife habitat and are not considered to be prime or unique farmlands. Thus, the topic of prime and unique farmland will not be addressed as an impact topic.

Water Resources (Including Wetlands and Floodplains): National Park Service policies require protection of water quality consistent with the Clean Water Act. Section 404 of the Clean Water Act authorizes the U.S. Army Corps of Engineers to prohibit or regulate, through a permitting process, discharge of dredged or fill material into U.S. waters. Although the wash is dry most of the year, it floods occasionally during the monsoonal rain season, with each flood lasting up to several hours. Because ephemeral washes are considered navigable waters of the United States, the U.S. Army Corps of Engineers (COE) was consulted about the project. According to the COE, the proposed bridge work meets the criteria of Nationwide Permit #14 (Road Crossing):

Nationwide Permit #14 Road Crossings : Fill for roads crossing waters of the United States (including wetlands and special aquatic sites), provided the activity meets all the following criteria:

- a) The width of the fill is limited to the minimum necessary for the actual crossing;

- b) The fill placed in waters of the United States is limited to a filled area of no more than 113 acre. Furthermore, no more than a total of 200-linear feet of the fill for the roadway can occur in special aquatic sites, including wetlands;
- c) The crossing is culverted, bridged or otherwise designed to prevent the restriction of, and to withstand, expected high flows and tidal flows, and to prevent the restriction of low flows and the movement of aquatic organisms;
- d) The crossing, including all attendant features, both temporary and permanent, is part of a single and complete project for crossing of a water of the United States; and,
- e) For fill in special aquatic sites, including wetlands, the permittee notifies the District Engineer in accordance with the "Notification" general condition. The notification must also include a delineation of affected special aquatic sites, including wetlands.

An authorization for Nationwide Permit #14 would be obtained prior to construction.

Executive Order 11990, Protection of Wetlands, requires federal agencies to avoid, where possible, impacts on wetlands. Proposed actions that have the potential to adversely impact wetlands must be addressed in a Statement of Findings. There are no jurisdictional wetlands within the project area. Therefore, wetlands was dismissed as an impact topic and a Statement Of Findings for wetlands will not be prepared.

Executive Order 11988, Floodplain Management, requires all federal agencies to avoid construction within the 100-year floodplain unless no other practical alternative exists. Certain construction within a 100-year floodplain requires preparation of a Statement Of Findings. Although the project area is within the 100-year floodplain, compliance with Executive Order 11988 is not required because bridges and day-use trails that are constructed in non-high hazard areas are excepted actions (National Park Service Floodplain Management Guidelines, 1993, V. B. Excepted Actions, 1&2). Therefore, floodplains was dismissed as an impact topic and a Statement Of Findings for floodplains will not be prepared.

The Storm Water Rule (40 CFR, Parts 122, 123, 124) requires an Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) Notice of Intent be submitted to the EPA, with a copy sent to the Arizona Department of Environmental Quality-Water Quality Division, on construction activities, including clearing and grading, that occur on land in excess of five acres (less than five acres if construction occurs in 2003 or after) or if the proposed action is part of an overall common plan of development. Implementing the proposed action would disturb less than three acres but the proposed action is part of an overall common plan of development (the 1992 General Management Plan/Development Concept Plans/Environmental Impact Statement); therefore, a NPDES notice of intent would be submitted to both the EPA and the Arizona Department of Environmental Quality-Water Quality Division, prior to any ground disturbing activities. When construction is complete, a notice of termination would be sent to the EPA and Arizona Department of Environmental Quality-Water Quality Division.

In addition, the EPA NPDES process requires preparation of a Storm Water Pollution Prevention Plan. The plan would be the guiding tool for the prevention, minimization, and mitigation of soil erosion and water pollution during construction activities. Should the proposed action be implemented, the contractor would be responsible for developing a park-approved plan. The plan would be available for public and agency inspection at the construction site.

Because (1) there would be no impacts to wetlands; (2) bridges constructed in non-high hazard areas are excepted floodplain actions; (3) the applicable nationwide permit authorization would be obtained by Petrified Forest National Park prior to the replacement of Jim Camp Wash bridge; and (4) a Storm Water Pollution Prevention Plan would be developed, water resources was dismissed as an impact topic.

Threatened, Endangered, Candidate Species and Species of Special Concern: The Endangered Species Act (1973) requires an examination of impacts on all federally-listed threatened or endangered species. National Park Service policy also requires examination of the impacts on federal candidate species, as well as state-listed threatened, endangered, candidate, rare, declining, and sensitive species. According to the U.S. Fish and Wildlife Service, the following federally listed threatened or endangered species may be found in Navajo and Apache counties (both Navajo and Apache counties are included in this analysis due to Rainbow Forest's proximity to Apache county):

Table 1, T & E Species Potentially Found in Navajo and Apache Counties

Common Name	Scientific Name	Status
California Condor	<i>Gymnops californianus</i>	Endangered
Mexican Gray Wolf	<i>Canis Lupus Baileyi</i>	Endangered
Peebles Navajo Cactus	<i>Pediocactus peeblesianus var peeblesianus</i>	Endangered
Black-Footed Ferret	<i>Mustela nigripes</i>	Endangered
Southwestern Willow Flycatcher	<i>Empidonax traillii extimus</i>	Endangered
Apache (Arizona) Trout	<i>Oncorhynchus Apache</i>	Threatened
Little Colorado Spinedance	<i>Lepidomeda vittata</i>	Threatened
Loach Minnow	<i>Tiaroga cobitis</i>	Threatened
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Threatened
Mexican Spotted Owl	<i>Strix occidentalis lucida</i>	Threatened
Navajo Sedge	<i>Carex specuicola</i>	Threatened
Mountain Plover	<i>Charadrius montanus</i>	Proposed Threatened
Chiricahua Leopard Frog	<i>Rana chiricahuensis</i>	Proposed Threatened

There are no permanent water sources in the project area or its general vicinity to support the Apache (Arizona) trout, Little Colorado spinedance, Loach minnow, or Chiricahua leopard frog, and no populations of the black-footed ferret are known to exist in northeastern Arizona. The Southwestern willow flycatcher I Mexican gray wolf, Peebles Navajo cactus, mountain plover, and Navajo sedge have never been observed in the Rainbow Forest area of Petrified Forest National Park. The bald eagle and California condor range over large areas and are potential transients in the park, but there are no known nesting sites in the Rainbow Forest area and the area is not vital for foraging and roosting.

Three plant species of special concern are found in the park. Gladiator milk vetch (*Astragalus xiphoides*) occurs in 15 known populations in the park, though none are in the Rainbow Forest area. Two known localities of the paper-spined cactus (*Pediocactus papyracanthus*) occur in the Rainbow Forest, but neither is in the vicinity of the project area. Grama grass cactus (*Toumeyia papyracanthus*) is found outside of the project area at higher elevations. Two other species of special concern are believed to occur within the park: the Springerville pocket mouse (*Perognathus flavus goodpastori*) and the Arizona giant sand treader cricket (*Daihinbaenetes arizonensis*). No occurrences of these species, however, have ever been observed in the Rainbow Forest area.

The topic of threatened, endangered, and candidate species and species of special concern was dismissed as an impact topic because (1) no federally listed threatened or endangered species are known to inhabit the Rainbow Forest area or its general vicinity; (2) none of the species of special concern have been observed in the vicinity of the project area; and (3) suitable habitat for migrating birds is found throughout the park, so they would be unaffected by construction.

Historic Structures and Ethnographic Resources: The National Historic Preservation Act, as amended in 1992 (16 USC 470 et seq.), and the National Environmental Policy Act (1969), as well as the National Park Service's Director's Order-28, Cultural Resource Management Guideline (1994), Management Policies (2001), and Director's Order-12, Conservation Planning, Environmental Impact Analysis and Decision-making (2001), require the consideration of impacts on historic structures and ethnographic resources either listed in or eligible to be listed in the National Register of Historic Places.

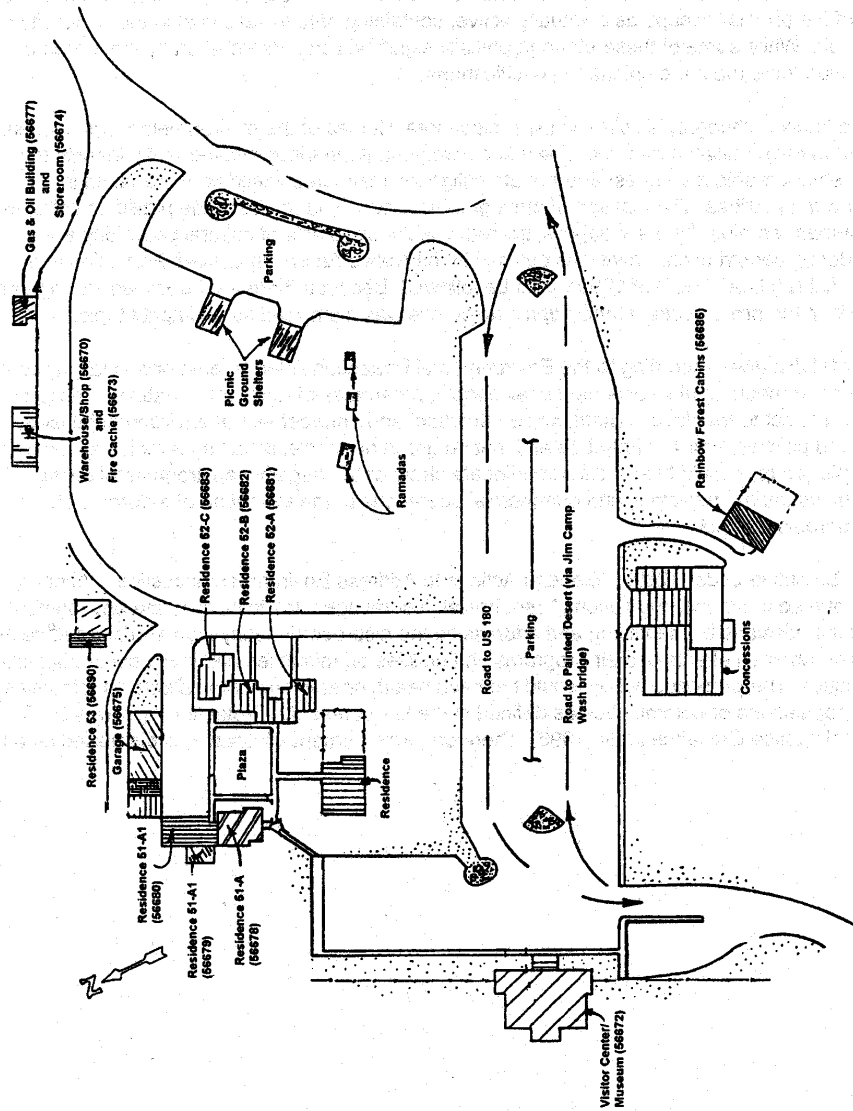
Historic Structures: The following table lists the historic structures identified as contributing elements of the Rainbow Forest Historic Landscape. Many of the structures are also listed on Petrified Forest National Park's List of Classified Structures (LCS), an evaluated inventory of all historic and prehistoric structures of historical, architectural, or engineering significance in the park.

Table 2, Historic Structures in Rainbow Forest Designed Historic Landscape

Structure	LCS #	Structure	LCS #
Rainbow Forest Employee Residence (51-A1)	56679	Rainbow Forest Employee Residence (51-A2)	56680
Rainbow Forest Employee Residence (52-B)	56682	Rainbow Forest Cabins	56685
Rainbow Forest Employee Residence (52-C)	56683	Rainbow Forest Employee Garage	56675
Rainbow Forest Employee Residence (52-A)	56681	Rainbow Forest Gas and Oil Building	56677
Rainbow Forest Employee Residence (51-A)	56678	Rainbow Forest Fire Cache	56673
Rainbow Forest Employee Residence (53)	56690	Rainbow Forest Storeroom	56674
Rainbow Forest Visitor's Center/Museum	56672	Rainbow Forest Warehouse and Shop	56676
Rainbow Forest Connecting Walls/Fencing	56684	Roads in residential area	N/A
Jim Camp Wash bridge	N/A	Rainbow Forest parking area	N/A
CCC-constructed sandstone curbing	N/A	CCC-constructed water pipeline	N/A
Mather Memorial	N/A	Water tank	N/A
Trail system at Giant Logs and Long Logs	N/A	Long Logs road	N/A
Spur road to CCC camp, old picnic area, and petroglyph/pictograph trail	N/A	CCC-constructed culverts on Long Logs road and Giant Logs trails, and along petroglyph road	N/A

Most of the structures identified as contributing elements of the Rainbow Forest Historic Landscape date from the 1930s and were built under "New Deal" era work programs, including the Civilian Conservation Corps (CCC). The visitor center/museum, residences, and the maintenance buildings are all rustic sandstone structures. They are low and flat roofed, in the southwestern tradition, and the residences are oriented around a central patio, further evincing the southwestern theme.

Of the above structures, the proposed action would directly or indirectly impact only Jim Camp Wash bridge; the Rainbow Forest parking area; the sandstone curbing and rock walls near the bridge, Long Logs road, the road's CCC era culverts, and the Long Logs' parking area. Because impacts to these structures, as well as potential mitigation, will be addressed under Cultural Landscapes, the separate topic of historic structures was dismissed as an impact topic in this document.



Buildings in Rainbow Forest on List of Classified Structures (denoted by LCS number)

Ethnographic Resources: Ethnographic resources are defined by the National Park Service as any “site, structure, object, landscape, or natural resource feature assigned traditional legendary , religious, subsistence, or other significance in the cultural system of a group traditionally associated with it” (DO-28, *Cultural Resource Management Guideline*, 191). Petrified Forest National Park is adjacent to the Navajo Indian Reservation and the Hopi, Zuni, and Fort Apache Indian Reservations are within a 75-mile radius. These peoples’ cultures are inextricably bound with the lands once occupied by their ancestors. They view much of the park landscape as spiritually active, containing certain sites vital to the continuity of their religious beliefs. While some of these ethnographically significant sites are shared by more than one American Indian tribe, most are unique to specific tribes.

There are no known ethnographic sites in the project area. Copies of the environmental assessment will be forwarded to each affiliated tribe for review and comment. If the tribes subsequently identify the presence of ethnographic resources, appropriate mitigation measures would be undertaken in consultation with the tribes. The location of ethnographic sites would not be made public. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (25 USC 3001) of 1990 would be followed. Because there are no known ethnographic resources within the project area, ethnographic resources was dismissed as an impact topic.

Environmental Justice: According to the Environmental Protection Agency, environmental justice is the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

Presidential Executive Order 12898, “General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing the disproportionately high and/or adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. The proposed action would not have health or environmental effects on minorities or low-income populations or communities as defined in the Environmental Protection Agency’s Draft Environmental Justice Guidance (July, 1996). Therefore, environmental justice was dismissed as an impact topic.

ALTERNATIVES

ALTERNATIVE A - NO ACTION

Under the No-Action Alternative, Jim Camp Wash bridge would not be replaced. The bridge would continue to deteriorate. Restrictive load limits may have to be placed on the bridge in the future. If the bridge were condemned and closed or if the bridge failed, there would be no alternate means of traversing the linear park.

The highway approach lanes to the Jim Camp Wash bridge would not be widened to reduce the accident potential caused by the current bridge and roadway design. In addition, Jim Camp Wash bridge would continue to present a safety hazard to visitors who walk across the bridge to access Long Logs, because the bridge is too narrow to safely accommodate both vehicular and pedestrian use. The width of the current bridge is also conducive to vehicle to vehicle conflicts, particularly in the case of oversized vehicles.

Long Logs road and parking area would not be converted into a 12-foot wide asphalt trail.

ALTERNATIVE B -PREFERRED ALTERNATIVE

Jim Camp Wash bridge, a low-profile, approximately 108-feet long and 24-feet wide, multi-barreled, concrete, box culvert structure, would be demolished. A replacement bridge would be erected along the original bridge's historic alignment. The replacement bridge would be a cast-in-place concrete slab span, supported by cylindrical piers. The replacement bridge would be approximately 190-feet long (58 meters) and 38-feetwide (11.76 meters). A preliminary profile of the replacement bridge is on page 23.

The replacement bridge is longer than the original bridge for hydraulic reasons. The longer, single span bridge would provide a less constricted channel for conveying flood flows, which would lessen the constriction of flowing water at the bridge and the resultant backwater effects that contribute to the possibility of overtopping (water flowing over the top of the bridge). In addition, the formation of stream bed dunes and accumulation of sand drifts deposited by winds in and around the crossing would be more effectively transported through the natural bottom channel offered by the single span bridge than through the more restrictive box culvert. The cylindrical bridge piers would also provide less drag and more open space for the even dispersal of sediment and accumulated sand in the bridge waterway during flood events.

The replacement bridge is wider than the original bridge, to accommodate increased traffic lane width and a pedestrian sidewalk. The cement sidewalk would be constructed on the downstream (south) side of the bridge, and would extend past the end of the bridge to the concession building. The sidewalk would be about 6'-feet wide and fully accessible. The sidewalk would be elevated 6-inches above the bridge and parking area surface, to minimize pedestrian-vehicle conflicts. The sidewalk curb from the west end of the bridge to the concession building would be sandstone, to match the color of the stone in the nearby rock walls. A 45-inch high guardrail constructed of tubular steel would be erected along the outer, or wash, side of the sidewalk, to ensure safer passage for pedestrians on the bridge. The guardrail would be painted a flat brown color, to blend as much as possible into the bridge's visual background.

The replacement bridge would be constructed in two stages. In the first stage the east side of the existing bridge would be demolished and then the east side of the replacement bridge constructed. The west side of the existing bridge would be used for one-way traffic during construction. In the second stage the east side of the newly constructed replacement bridge would be opened to one-way traffic while the west side of the existing bridge is demolished. The west side of the replacement bridge would be then be constructed.

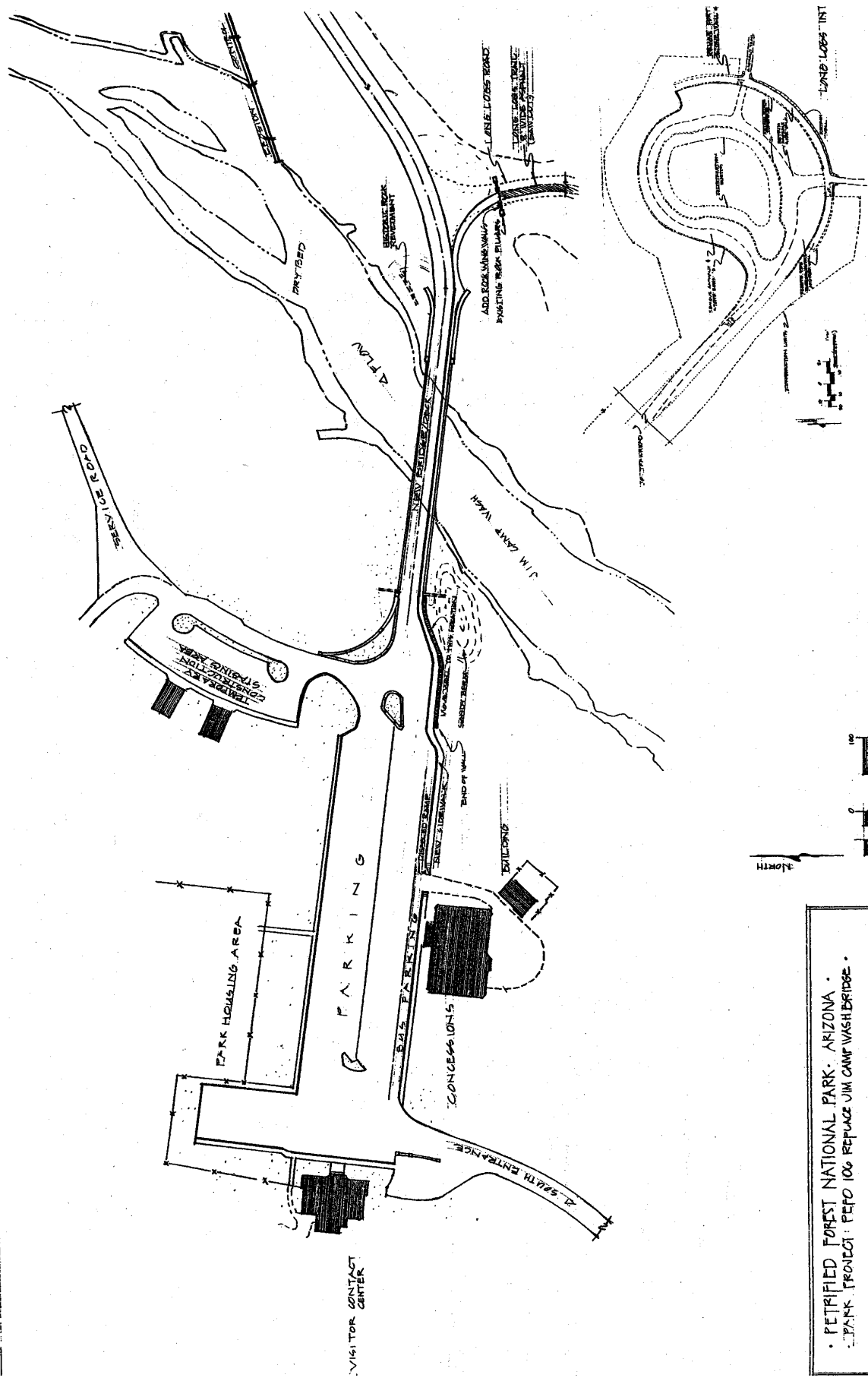
A 12-foot wide pedestrian trail would be saw cut from the existing 24-foot wide asphalt surface of Long Logs road, allowing the trail to follow the route of the approximately 2,000-foot long roadbed (see Site Map, page 21). The remaining asphalt would be obliterated and removed (about 2,600 sq. yards). The former roadbed prism would be retained and revegetated with native species to restore its natural appearance. The three, 18-inch diameter, corrugated metal culverts along the former road would be left in place, to lessen potential erosion of the former roadbed. The 12-foot wide asphalt trail to Long Logs would permit access by the mobility impaired, as well as continued emergency vehicle access.

The saw cut trail would continue around the circumference of the Long Logs parking loop, adjacent to the interior rock curbing of the parking loop island, which would not be removed. The remaining asphalt surface of the parking loop would be obliterated and removed (about 3,000 sq. yards). Most of the extant concrete sidewalk and curbing at the parking loop, as well as the rock retaining walls, would remain in place between the existing north and south trail entrances. The existing rock mass and vegetation island in the center of the former parking loop would also be retained.

The rock removed from the curbing around the parking island would be used to build two core wing walls at the Long Logs trail head along the main park road. The two wing walls, each about 6-feet long and 3-feet high, would be constructed adjacent to, but not in contact with, two historic stone posts built by the Civilian Conservation Corps. The two wing walls and a removable bollard set in the center of the former roadway will prevent unauthorized vehicles from accessing the Long Logs trail.

All areas to be revegetated would be revegetated using both seed previously collected from the project area and commercial seed that meets strict National Park Service guidelines for importation of seed. Revegetation efforts would be directed to reconstructing the natural spacing, abundance, and diversity of native plant species. Erosion control matting would be installed on all seeded areas susceptible to erosion.

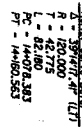
Staging and stockpiling for the project would occur on the parking area in the Rainbow Forest developed area, near the picnic shelters.



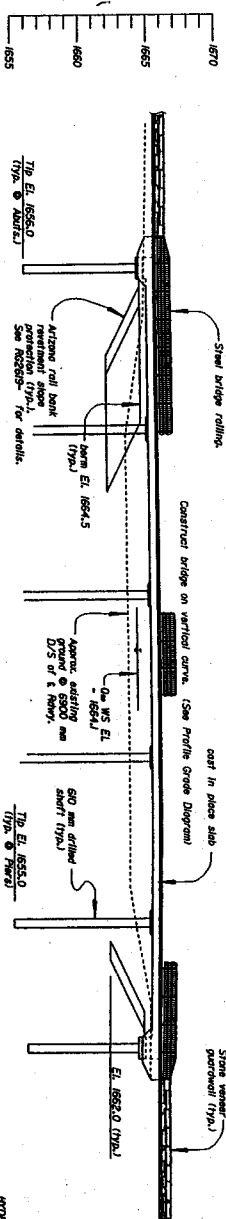
• PETRIFIED FOREST NATIONAL PARK, ARIZONA •
 • PARK PROJECT: PEFO 106 REPLACE JIM CAMP WASH BRIDGE •

SITE MAP

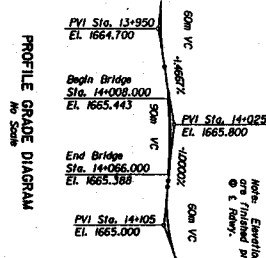
U.S. DEPARTMENT OF THE INTERIOR • NATIONAL PARK SERVICE • DENVER SERVICE CENTER



REGION	S&TE	PROJECT	SHEET NO.	TOTAL SHEET
AZ		PRA PEDF (OCS)		



PLAN



Notes: Elevations shown
are finished profile grade
© E. Ridway.

APPLIED STRUCTURAL LOADS:
Abuts. - xxx kN/shaft
Piers - xxx kN/shaft

Note: See RC2619-B for Foundation Plan and General Notes.

ESTIMATE:

[illegible]

NOTES:

- (2) Includes cost of furnishing and installing preformed joint filler and elastomeric bearing pads.
- (3) Includes cost of furnishing and installing guard angles. Estimated quantity = slab sq. ft.
- (4) Includes payment for concrete, reinforcing steel, and mechanical splices if necessary.
- (5) Includes cost of concrete, anchors, mortar, grout, masonry and other materials required for construction of masonry railing.

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14408.000 = 14008 meters
1665.443 = 1665.443 meters
58000 = 58000 millimeters

Note: All elevations and stationing
are in meters. All other
dimensions are in millimeters.

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION
JIM CAMP WASH BRIDGE
PETRIFIED FOREST NATIONAL PARK
NAVAJO COUNTY, ARIZONA
PLAN AND ELEVATION

[illegible]

Mitigation Measures of the Preferred Alternative: Prior to implementing the preferred alternative, all structures and landscape features that would be affected, and are contributing elements of the Rainbow Forest Historic Landscape (Jim Camp Wash bridge, Long Logs road, rock walls and curbing), would be documented to the standards of the Historic American Engineering Record. Such documentation would ensure that appropriate information about affected structures and landscape features is preserved through drawings and sketch plans, photographs with large format negatives, and brief narrative histories of affected structures recorded on architectural data forms.

The Rainbow Forest visitor area was designed with a straight sight line between the museum and the Jim Camp Wash bridge/entry road. The sight line goes from the museum to the flagpole, down the middle of the parking lot, and is aligned with the center line of the bridge. The replacement bridge would be constructed in the same location as the original bridge, to preserve the straight site line between the museum and the bridge and preserve the arrival experience to Rainbow Forest. To avoid creating a false historical appearance, the replacement bridge would not be a reconstruction but rather would be visually compatible to the bridge that was once there and its surroundings, i.e. similar in scale, massing and materials, texture, and orientation.

Saw-cutting a 12-foot wide pedestrian trail from Long Logs road and parking area, without altering the road's original prism, and allowing the trail to follow the route of the former roadbed, as well as preserving the original culverts along the former roadbed, would leave both the topography and original design of the Long Logs area relatively undisturbed. Leaving the former road prism intact and preserving the existing culverts, as well as retaining much of the rock walls and curbing at the former parking area, would enable the park to interpret and visitors to better visualize how the Long Logs area once appeared and functioned.

If during construction previously unknown archeological resources are discovered, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and an appropriate mitigation strategy developed in consultation with the state historic preservation officer.

All proposed documentation/recordation and mitigative measures for cultural resources would be stipulated in a Memorandum of Agreement between Petrified Forest National Park and the Arizona state historic preservation office and/or, as necessary, the Advisory Council on Historic Preservation.

Construction zones would be identified and fenced with construction tape or some similar material prior to any construction activity. The fencing would define the construction zone and confine activity to the minimum area required for construction. All protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond the construction zone as defined by the fencing. Some materials may be stockpiled at the park boneyard, but no materials would be moved out of the park. In addition, the National Park Service would ensure that all contractors and subcontractors are informed that damage to resources outside the scope of work is subject to prosecution, fine, restitution costs, and other penalties.

Soil cast aside during construction would also be susceptible to some erosion, though such erosion would be minimized by placing silt fencing around the excavated soil. Silt fencing fabric would be inspected weekly or after every major storm. Accumulated sediments would be removed when the fabric is estimated to be approximately 75% full. Excavated soil may be used in the construction project; excess soil would be stored in approved areas.

Local borrow and stone material, if required, would be available through sources in the vicinity of Holbrook, Arizona. All borrow material would be certified archeologically sterile and weed free.

To avoid introduction of exotic plant species, no hay bales would be used to control soil erosion. Hay often contains seed of undesirable or harmful alien plant species. Therefore, on a case-by-case basis the following materials may be used for any erosion control dams that may be necessary: rice straw, straws determined by NPS to be weed-free (e.g., Coors barley straw or Arizona winter wheat straw), cereal grain straw that has been fumigated to kill weed seed, and wood excelsior bales. Standard erosion control measures such as silt fences and/or sand bags would also be used to minimize any potential soil erosion.

Fueling of all construction equipment would be conducted only in equipment staging areas. During the operation of equipment some petrochemicals could seep into the soil. To minimize this possibility all equipment would be checked frequently to identify and repair any leaks.

General Construction Schedule and Cost: Construction would occur over an approximate 9-month period, during 2001-2002. Revegetation would occur as construction is completed. The net construction cost of this project is estimated to be about \$2.07 million, in FY -2001 dollars.

ALTERNATIVES CONSIDERED BUT DISMISSED FROM FURTHER ANALYSIS

Petrified Forest National Park considered several alternatives for Jim Camp Wash bridge during the planning process. Though the alternatives differed in their approach to Jim Camp Wash bridge vehicular access to Long Logs would be eliminated in each alternative and visitor access to Long Logs would be accomplished as described in the preferred alternative (eliminating vehicular access and creating the pedestrian trail is an implementation of the preferred alternative of the 1992 General Management Plan/Development Concept Plans/Environmental Impact Statement).

A Choosing by Advantages (CBA) decision making workshop (March 30-31, 2000) rigorously evaluated a variety of action alternatives based upon 12 factors:

- 1) Prevent loss of natural resources
- 2) Maintain/reinforce/improve integrity of cultural resources
- 3) Provide enjoyable pedestrian access to Long Logs
- 4) Provide safe visitor access
- 5) Inspire a sense of arrival
- 6) Minimize construction inconveniences to the visitor
- 7) Provide long-lived facility
- 8) Minimize staff and skill required to maintain facility
- 9) Provide for employee safety
- 10) Provide smooth, efficient, safe construction
- 11) Improve hydraulic efficiency
- 12) Safely pass project design flood flow (50-year storm event)

During the CBA workshop, the following alternatives were considered but dismissed from further analysis:

- Rehabilitate Jim Camp Wash bridge and either construct a pedestrian bridge downstream of the existing bridge or extend the box culverts to allow room for the construction of a pedestrian bridge adjacent to the rehabilitated bridge. Constructing a pedestrian bridge downstream would result in greater impacts to the natural environment than the preferred alternative, and the additional excavation could reveal and disturb archeological resources. Although rehabilitation of Jim Camp Wash bridge would lessen the impacts to the Rainbow Forest Historic Landscape, rehabilitation of the bridge does not address the long-term problems of functionality and inadequate hydraulic capacity. The multi-barreled, box culvert, would not provide a less constricted channel for conveying flood flows, especially a 50-year flood event, or prevent the artificial accumulation of debris and silt and the formation of stream bed dunes. In addition, winds would continue to deposit sand drifts on the bridge's driving surface.

- Replace the existing bridge with a single span bridge erected along the original alignment and divert traffic flow during construction to a temporary, at-grade detour constructed in the wash upstream of the bridge. A raised sidewalk on the replacement bridge would separate pedestrians and vehicles. This alternative was rejected because building the temporary detour would result in greater impacts to the undisturbed, upstream natural environment than the preferred alternative, replacing Jim Camp Wash bridge in stages, and the additional excavation could reveal and disturb archeological resources. In addition, Jim Camp Wash is subject to flash flooding and any vehicle or pedestrian caught in the at-grade or low water crossing during a flash flood would be at risk.
- Replace Jim Camp Wash bridge with a single span bridge erected about 20-yards downstream of the existing bridge. A raised sidewalk on the replacement bridge would separate pedestrians and vehicles. The existing bridge would remain open during construction of the replacement bridge and be demolished once the new bridge is operational. This alternative was rejected because constructing a replacement bridge downstream would result in greater impacts to the natural environment than the preferred alternative, and the additional excavation could reveal and disturb archeological resources. In addition, constructing a replacement bridge downstream and demolishing Jim Camp Wash bridge would more adversely impact the Rainbow Forest Historic Landscape than replacing the bridge on its existing alignment.
- Replace Jim Camp Wash bridge with a single span bridge erected slightly downstream and offset from the existing bridge, with the centerline of the replacement bridge aligned to the centerline of the Rainbow Forest parking area. A raised sidewalk on the replacement bridge would separate pedestrians and vehicles. Traffic flow during construction would use a reduced segment of the existing bridge prior to its demolition. This alternative was rejected because constructing a replacement bridge downstream would result in greater impacts to the natural environment than the preferred alternative, and the additional excavation could reveal and disturb archeological resources.
- Replace Jim Camp Wash bridge with an at-grade or low water crossing through the wash. Passage of vehicles and pedestrians would be limited to dry conditions only. The at-grade or low water crossing would be constructed upstream from Jim Camp Wash bridge. The existing bridge would remain open during construction of the crossing and be demolished once the crossing is operational. This alternative was rejected because constructing an at-grade or low water crossing and demolishing Jim Camp Wash bridge would more adversely impact the Rainbow Forest Historic Landscape than replacing the bridge on its existing alignment. In addition, construction would result in greater impacts to the undisturbed, upstream natural environment than the preferred alternative, and the additional excavation could reveal and disturb archeological resources. Also, Jim Camp Wash is subject to flash flooding and any vehicle or pedestrian caught in the at-grade or low water crossing during a flash flood would be at risk. The at-grade or low water crossing would not permit year-round, all weather access through the park.

On August 8, 2000 the National Park Service's Development Advisory Board Review affirmed that each of the above alternatives either unsatisfactorily addressed project objectives or resulted in too great of impacts to Petrified Forest National Parks' natural and cultural resources.

Three additional alternatives, encompassing a variety of site improvements for the Rainbow Forest area, were examined during consultations with the Arizona state historic preservation office. Again, in each alternative vehicular access to Long Logs would be eliminated and visitor access to Long Logs would be accomplished as described in the preferred alternative, in accordance with the 1992 General Management Plan/Development Concept Plans/Environmental Impact Statement.

In the first alternative (see page 32, Concept Sketch "A"), the existing park road south of the Rainbow Forest area would be rerouted to the east, crossing Jim Camp Wash on a new bridge erected south of the existing bridge (the rerouted

road would be about 1, 700-feet long and 24-feet wide). Jim Camp Wash bridge would be rehabilitated and vehicles approaching the Rainbow Forest area from the north or the south would either continue to proceed along the park road or cross Jim Camp Wash bridge to access the parking area, which is adjacent to the visitor center/museum and concessions. Vehicles would no longer drive-through the Rainbow Forest parking area. A pedestrian bridge would either be constructed downstream of the rehabilitated Jim Camp Wash bridge or the bridge's box culverts would be extended to allow room for the construction of an adjacent pedestrian bridge. Visitors would walk across the pedestrian bridge, either adjacent to the rehabilitated bridge or downstream, to access Long Logs road, which would be converted to a pedestrian trail. The abandoned park road would be obliterated and the area revegetated (about 0.3 acres), to reconstruct the natural spacing, abundance, and diversity of native plant species.

The above alternative was dismissed from further consideration because:

- The rerouted park road would traverse a large area of petrified wood. Both chipped and flaked petrified wood and larger surface and subsurface logs would be impacted. Petrified Forest National Park was created in 1906 to preserve and protect concentrations of petrified wood, and petrified wood is the park's primary , nonrenewable resource. Routing the park road through this area would conflict with the mandate to protect the park's primary resource.
- Constructing the rerouted park road south of the Rainbow Forest visitor center/museum and concessions would result in construction impacts to an additional 0.9-acres of park land.
- The rerouted park road and new bridge, as well as a possible second pedestrian bridge, would potentially disturb several known prehistoric archeological sites, most significantly a variety of petrified log chipping stations. The chipping stations are considered to be collectively eligible for listing on the National Register of Historic Places as a thematic district, associated with lithic production over time and prehistoric technology. If the sites were to be disturbed by construction, the mitigative data recovery would be costly and time consuming.
- The rerouted road and new bridge, as well as a possible second pedestrian bridge, would alter the historic circulation patterns, including the entry drive sight line, and spatial organization of the Rainbow Forest Historic Landscape.
- Rehabilitating Jim Camp Wash bridge does not address the long-term problems associated with the bridge's inadequate hydraulic capacity .The multi-barreled, box culvert, would not provide a less constricted channel for conveying flood flows, especially a 50-year flood event, or prevent the artificial accumulation of debris and silt and the formation of stream bed dunes. In addition, winds would continue to deposit sand drifts on the bridge's driving surface.
- The turn around movement for buses, large recreational vehicles, and trailers in the parking area would be insufficient. Backing of such vehicles would be required in order to turn around and return to the park road. Major modification and/or expansion of the existing parking area would be necessary to provide sufficient radius for turning movements.

In the second alternative (see page 33, Concept Sketch "B"), the park road through the Rainbow Forest area would be rerouted to parallel the northwestern edge of Jim Camp Wash, eliminating the existing drive-through parking area (the rerouted road would be about 2,600-feet long and 24-feet wide). Jim Camp Wash bridge would be closed to vehicular traffic and a traffic circle (rotary) would be constructed between the west end of Jim Camp Wash bridge and the existing parking area. Three additional vehicular bridges would be constructed. Two culverts would span unnamed washes -one south of the visitor center/museum and concessions area and one to the north, and a single span bridge would be built over Jim Camp Wash to the north of the existing bridge. Vehicles approaching the Rainbow Forest area from either the

north or the south would use the traffic circle to either access the parking area for the visitor center/museum and concessions or continue along the park road. Jim Camp Wash bridge would be rehabilitated, and pedestrians would walk across the bridge to access Long Logs via the nearby Long Logs road, which would be converted to a pedestrian trail. The abandoned park road would be obliterated and the area revegetated (about 0.9 acres), to reconstruct the natural spacing, abundance, and diversity of native plant species.

The above alternative was dismissed from further consideration because:

- The rerouted park road to both the south and north of the Rainbow Forest visitor center/museum and concessions would traverse large areas of petrified wood. Both chipped and flaked petrified wood and larger surface and subsurface logs would be impacted. Petrified Forest National Park was created in 1906 to preserve and protect concentrations of petrified wood, and petrified wood is the park's primary , nonrenewable resource. Routing the park road through this area would conflict with the mandate to protect the park's primary resource.
- Constructing the rerouted park road would result in construction impacts to an additional 1.4-acres of park land.
- The rerouted park road would potentially disturb several known prehistoric and historic archeological sites, and the potential for other prehistoric and historic archeological sites is high. The rerouted park road south of the visitor center/museum and concessions area would potentially disturb a variety of petrified log chipping stations. The chipping stations are considered to be collectively eligible for listing on the National Register of Historic Places as a thematic district, associated with lithic production over time and prehistoric technology. If the sites were to be disturbed by construction, the mitigative data recovery would be costly and time consuming.
- The rerouted park road north of the Rainbow Forest visitor center/museum and concessions would potentially impact paleontological resources (fungus preserved in petrified wood).
- The northern segment of the rerouted park road would disturb a reclaimed short-grass prairie, as well as cross sand dunes used as winter harborage by park wildlife. In addition, the wash to north, where the new bridge would be constructed, is a travel corridor for pronghorn.
- The rerouted road and the three new bridges would alter the historic circulation patterns, including the entry drive sight line, and spatial organization of the Rainbow Forest Historic Landscape. In addition, more of the Civilian Conservation Corps era rock walls in the parking area would be disturbed by construction of the traffic circle. Also, the rerouted road would disturb the "petroglyph road," an unimproved road and low water crossing built by the Civilian Conservation Corps during the early 1930s.
- Rehabilitating Jim Camp Wash bridge does not address the long-term problems associated with the bridge's inadequate hydraulic capacity .The multi-barreled, box culvert, would not provide a less constricted channel for conveying flood flows, especially a 50-year flood event, or prevent the artificial accumulation of debris and silt and the formation of stream bed dunes. In addition, winds would continue to deposit sand drifts on the bridge's driving surface.
- The northern segment of the rerouted park road would require more bridge approach embankment and riprap to cross a wider flood plain, and the channel bank adjacent to the southern segment of the rerouted road would likely require stability improvements such as riprap and/or Arizona rail. The additional bridge approach embankment and riprap or Arizona rail would result in a greater visual impact.
- The traffic circle would be confusing to motorists and hazardous to pedestrians using Jim Camp Wash bridge to access Long Logs. Possible motorist confusion could result in wrong way travel through

the parking area. There would be increased potential for both vehicle to vehicle accidents and vehicle to pedestrian accidents.

- Speed bumps would be required on the rerouted park road, to slow vehicular traffic approaching the traffic circle. Speed bumps can be destructive to vehicles.

In the third alternative (see page 34, Concept Sketch "C"), the park road through the Rainbow Forest area would be partially rerouted to parallel the northwestern edge of Jim Camp Wash, also eliminating the existing drive-through parking area (the rerouted road would be about 1,000-feet long and 24-feet wide). Jim Camp Wash bridge would either be rehabilitated or a replacement bridge would be constructed along the historic alignment of the existing bridge. A new bridge, probably a box culvert, would be erected south of the visitor center/museum and concessions area, to span an unnamed wash. A traffic circle (rotary) would be constructed between the west end of Jim Camp Wash bridge and the parking area. Vehicles approaching the Rainbow Forest area from either the north or the south would use the traffic circle to either access the parking area, which is adjacent to the visitor center/museum and concessions, or continue along the park road. A pedestrian bridge would either be constructed downstream of the rehabilitated Jim Camp Wash bridge or the bridge's box culverts would be extended to allow room for the construction of a an adjacent pedestrian bridge. Visitors would walk across the pedestrian bridge, either adjacent to the rehabilitated bridge or downstream, to access Long Logs road, which would be converted to a pedestrian trail. The abandoned park road would be obliterated and the area revegetated (about 0.3 acres), to reconstruct the natural spacing, abundance, and diversity of native plant species.

The above alternative was dismissed from further consideration because:

- The rerouted park road south of the Rainbow Forest visitor center/museum and concessions would traverse a large area of petrified wood. Both chipped and flaked petrified wood and larger surface and subsurface logs would be impacted. Petrified Forest National Park was created in 1906 to preserve and protect concentrations of petrified wood, and petrified wood is the park's primary nonrenewable resource. Routing the park road through this area would conflict with the mandate to protect the park's primary resource.
- Constructing the rerouted park road would result in construction impacts to an additional 0.6-acres of park land.
- The rerouted park road and new bridge, as well as a possible second pedestrian bridge, would potentially disturb several known prehistoric archeological sites, most significantly a variety of petrified log chipping stations. The chipping stations are considered to be collectively eligible for listing on the National Register of Historic Places as a thematic district, associated with lithic production over time and prehistoric technology. If the sites were to be disturbed by construction, the mitigative data recovery would be costly and time consuming.
- The rerouted road, and potentially a new pedestrian bridge, would alter the historic circulation patterns, including the entry drive sight line, and spatial organization of the Rainbow Forest Historic Landscape. In addition, more of the Civilian Conservation Corps era rock walls in the parking area would be disturbed by construction of the traffic circle. If Jim Camp Wash bridge were rehabilitated, the long-term problems associated with the bridge's inadequate hydraulic capacity would remain. The multi-barreled, box culvert, would not provide a less constricted channel for conveying flood flows, especially a 50year flood event, or prevent the artificial accumulation of debris and silt and the formation of stream bed dunes. In addition, winds would continue to deposit sand drifts on the bridge's surface.
- The channel bank adjacent to the southern segment of the rerouted road would likely require stability improvements such as riprap and/or Arizona rail, resulting in a greater visual impact.

- The traffic circle would be confusing to motorists and hazardous to pedestrians using Jim Camp Wash bridge to access Long Logs. Possible motorist confusion could result in wrong way travel through the parking area. There would be increased potential for both vehicle to vehicle accidents and vehicle to pedestrian accidents.
- Speed bumps would be required on the rerouted park road, to slow vehicular traffic approaching the traffic circle. Speed bumps can be destructive to vehicles.

The 12 factors developed to evaluate alternatives during the previous Choosing by Advantages decision making workshop (see page 26) were also used to informally evaluate the three alternatives examined above. Each of the three alternatives was compared and contrasted to the National Park Service's preferred alternative (replace Jim Camp Wash bridge along its historic alignment, widen the highway approach lanes to the replacement bridge, and provide a pedestrian walkway on the replacement bridge). In five of the 12 factors, the National Park Service's preferred alternative reflected a significant advantage;

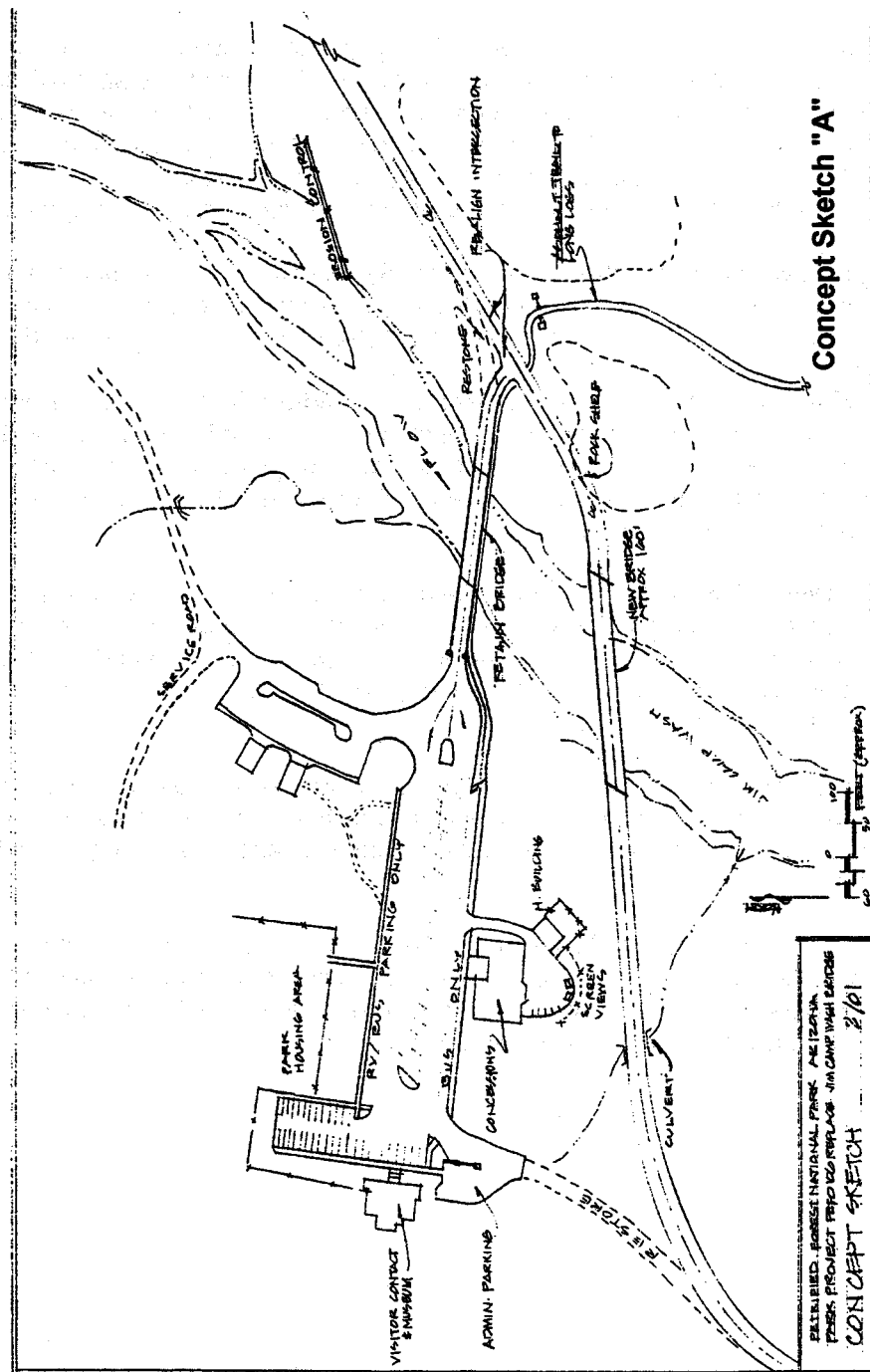
Factor 1, Prevent Loss of Natural Resources: By concentrating construction activities within existing disturbed areas, the preferred alternative limits potential impacts to Petrified Forest National Park's primary , nonrenewable resource -petrified wood.

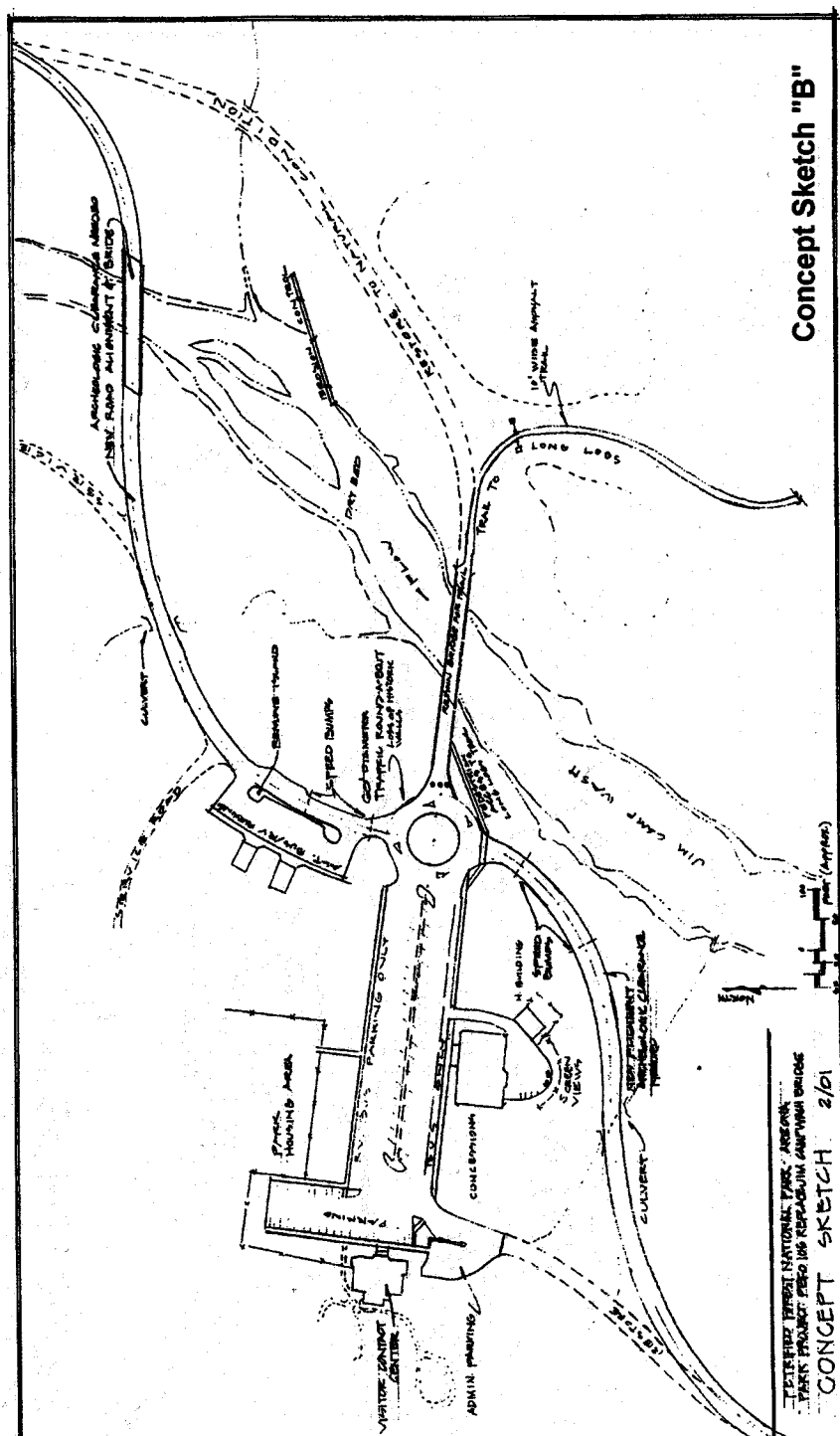
Factor 2, Maintain/Reinforce/Improve Integrity of Cultural Resources: The preferred alternative would preserve to a greater extent the integrity of the Rainbow Forest Historic Landscape, by preserving the historic circulation patterns, including the entry drive sight line and spatial organization. In addition, fewer of the rock walls built by the Civilian Conservation Corps would be disturbed.

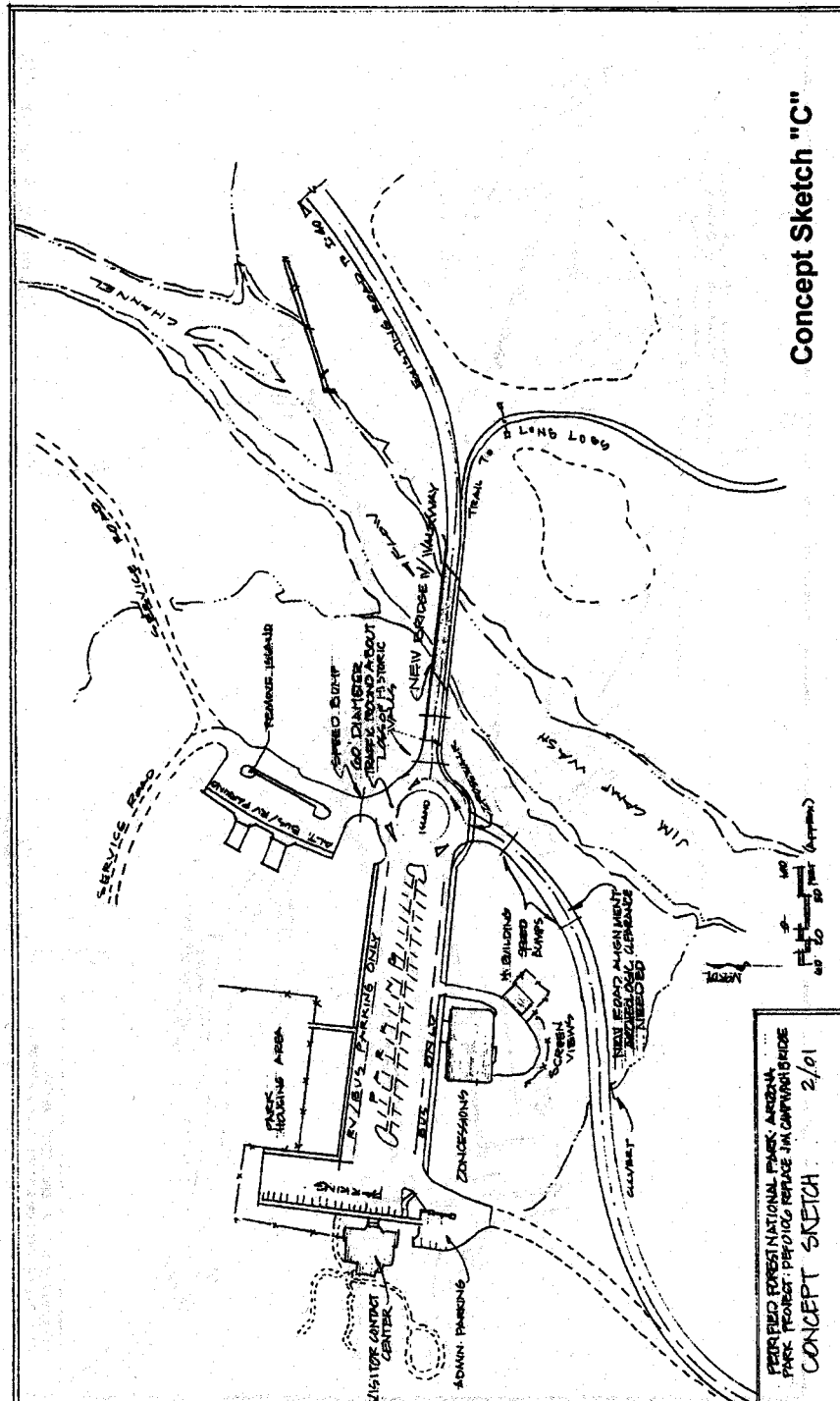
Factor 4, Provide Safe Visitor Access: The preferred alternative would provide safer visitor access to the Rainbow Forest area by (1) maintaining the existing design feature of traffic calming that is encouraged by the drive-through parking area and (2) providing for safe pull through traffic movements in the parking area for over-sized vehicles; no backing movements are required.

Factor 5, Inspire a Sense of Arrival: The preferred alternative inspires a sense of arrival at the Rainbow Forest area by preserving the entry sight lines that encourage visitors to stop at the visitor center/museum. The existing visitor sequencing of "see, approach, and enter" is retained.

Factor 11, Improve Hydraulic Efficiency: By replacing Jim Camp Wash bridge with a single span bridge and avoiding the construction of additional vehicular or pedestrian bridges, the preferred alternative would eliminate obstructions/constrictions in the wash's channel that exacerbate flood-flow consequences.







COMPARATIVE SUMMARY OF NO ACTION AND PREFERRED ALTERNATIVES

Table 3, Comparative Summary of Alternatives

Alternative A – No Action	Alternative B – Preferred Alternative
Jim Camp Wash bridge would not be replaced. The bridge would continue to deteriorate. Restrictive load limits may be placed on bridge in future or bridge could be condemned and closed, necessitating replacement of bridge at future date. Highway approach lanes to bridge would not be widened. Pedestrians would continue to share bridge roadbed with vehicles.	Jim Camp Wash bridge would be replaced. Replacement bridge would be erected along historic alignment of existing bridge. Highway approach lanes to bridge would be widened. Replacement bridge would have pedestrian sidewalk adjacent to and 6-inches above roadbed of bridge.
Long Logs road would not be saw cut into foot trail. Vehicular access of Long Logs would continue.	Twelve feet wide foot trail would be saw cut from asphalt of Long Logs road and parking area, eliminating vehicular access to area.

The preferred alternative meets the project objectives of addressing the insufficient capacity of Jim Camp Wash bridge (inadequate freeboard and capacity for design flow); widening the highway approach lanes to better accommodate today's larger recreation vehicles and trailers; enhancing the safety of visitors walking to Long Logs from the Rainbow Forest parking area; and eliminating vehicular access to Long Logs to reduce the theft of petrified wood from the area. Eliminating vehicular access to Long Logs for the protection of petrified wood is part of the preferred alternative from the park's General Management Plan/Development Concept Plans/Environmental Impact Statement (1992).

COMPARATIVE SUMMARY OF ENVIRONMENTAL IMPACTS-NO ACTION AND PREFERRED ALTERNATIVES

Table 4, Comparative Summary of Potential Environmental Impacts

Potential Environmental Impacts		
Impact Topic	No Action Alternative	Preferred Alternative
Geology & Soils	No new impacts to geology and soils.	No new impacts to geologic resources. Pre-disturbed areas would be used for staging and stockpiling. Construction related impacts would be adverse and minor to moderate in intensity but short-term, lasting only as long as construction.
Paleontological Resources	No new impacts to Triassic rock exposures or known fossil deposits. Continued vehicular access to Long Logs would not result in reduction of petrified wood taken from area. Long-term impacts to petrified wood, the park's primary, nonrenewable resource, would be adverse and of moderate intensity.	No new impacts to Triassic rock exposures or known fossil deposits. Eliminating vehicular access to Long Logs would result in a reduction of petrified wood taken from the area, resulting in long-term, moderate to major beneficial impact.
Air Quality	No new impacts to air quality.	Minor, short-term degradation due to construction related dust/emissions. Effects last only as long as construction and park's Class I air quality would not be affected.
Biotic Communities	No new impacts to biotic communities.	Section of Rainbow Forest parking area used for staging and stockpiling. Revegetation following construction would reconstruct the natural spacing, abundance, and diversity of native plant species. Overall impacts to vegetation would be adverse but minor and short-term. Wildlife would be temporarily disturbed and displaced during construction, but would be expected to reoccupy project area after construction. Overall impacts to wildlife would be adverse but minor and short-term.
Archeological Resources	Continued vehicular access to Long Logs would not result in reduction of visitors to Agate House. Site would remain more vulnerable to inadvertent disturbance and vandalism. Long-term, adverse impacts would range in intensity from minor to moderate.	Construction activities would have no effect on known resources. Eliminating vehicular access to Long Logs would result in reduction of visitors to Agate House, reducing incidences of inadvertent disturbance and vandalism. Long-term, beneficial impacts would range in intensity from minor to moderate.
Cultural Landscapes	Capacity of Jim Camp Wash bridge would continue to be inadequate and bridge would continue to deteriorate. Eventually bridge would need to be demolished and replaced. This would result in a long-term, moderate, adverse impact.	Several historic landscape elements (bridge, curbing, walls, Long Logs road and parking area) would be removed. There would be long-term changes in scale relationships and visual impacts: new bridge would be wider, and combined with wider approach lanes, would increase scale of developed landscape elements. Converting Long Logs road into foot trail and resultant reduction of pavement width, addition to the entry gate, and changes to pedestrian circulation only in Long Logs area would alter type of use and scale of developments. Retaining historic alignment of center line of bridge with flagpole and museum, and integrating pedestrian bridge with new vehicular bridge, would mitigate overall impact. Impact would be long-term, moderate, and adverse.

Table 4 continued, Comparative Summary of Environmental Impacts

Potential Environmental Impacts		
Impact Topic	No Action Alternative	Preferred Alternative
Visitor Use and Experience	Possible implementation of load restrictions on bridge or closure would result in short-term, moderate, adverse impacts. Vehicle access to Long Logs would continue, which would benefit visitors unable or unwilling to walk a trail to Long Logs and Agate House. Lack of a longer hike in the park, as would be afforded by creation of a pedestrian trail to Long Logs, would adversely impact visitors seeking such experiential opportunities.	<p>Construction would introduce visual, audible, atmospheric intrusions, but such intrusions would occur during park's off-season, when visitation is lower, and would be localized and temporary. Impacts would be minor and adverse but short-term.</p> <p>Traffic flow and vehicle access to Rainbow Forest area may be temporarily restricted. Construction would occur during off-season when visitation is lowest, and all efforts would be made to reduce delays and road closures. Such impacts would be adverse and minor to moderate intensity, but short-term.</p> <p>Replacing Jim Camp Wash Bridge and widening approach lanes would have long-term, moderate beneficial impact on visitor use. Closing Long Logs road would reduce visitation to Long Logs and Agate House, resulting in long-term, minor to moderate adverse impacts on visitors unable or unwilling to walk to the sites. Such visitors, however, have other opportunities to view petrified wood without walking long distances, e.g. at Crystal Forest. Other visitors, who enjoy longer hikes than currently provided in the park, would perceive the closure as beneficial.</p>
Park Operations	Possible implementation of load restrictions on bridge or closure would result in short-term, moderate, adverse impacts.	Maintenance of new bridge, as compared to that for Jim Camp Wash bridge, would be reduced, resulting in long-term, minor to moderate beneficial impacts. There would be increased protection for Rainbow Forest's petrified wood without increasing park staffing requirements – a long-term, minor beneficial impact to park operations.
Socioeconomic Environment	Failure or unplanned closure of bridge would result in reduction of visitation to Rainbow Forest area, a moderate, adverse impact upon concessionaire and two businesses near park's south entrance until bridge was replaced.	Because traffic flow through park would be impeded but not interrupted, any construction related impacts to concessionaire and two businesses near park's south entrance would be adverse but negligible to minor in intensity and short-term.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which is guided by the Council on Environmental Quality (CEQ). The CEQ provides direction that "[t]he environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA's Section 101 :

- fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- assure for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings;
- attain the widest range of beneficial uses of the environment without degradation, risk of health or safety , or other undesirable and unintended consequences;
- preserve important historic, cultural and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
- achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and
- enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Generally this means the alternative that causes the least damage to the biological and physical environment. It also means the alternative that best protects, preserves, and enhances historic, cultural, and natural resources." (Council on Environmental Quality , "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations" (40 CFR 1500-1508), *Federal Register* Vol. 46, No.55, 18026-18038, March 23, 1981: Question 6a.).

The preferred alternative (demolish Jim Camp Wash Bridge and replace it with a bridge erected on the same alignment, and convert Long Logs road and parking area to a pedestrian trail) is the environmentally preferred alternative. After careful review of potential resource and visitor impacts, and developing proposed mitigation for impacts to cultural resources, the preferred alternative best strikes a balance between the necessity of replacing Jim Camp Wash bridge and enhancing visitor safety with the preservation of the park's cultural resources (Rainbow Forest Historic Landscape), as well as preservation of the park's primary , nonrenewable resource -petrified wood.

ENVIRONMENTAL CONSEQUENCES

METHODOLOGY FOR ASSESSING IMPACTS

Impacts are described in terms of type (are the effects beneficial or adverse?), context (are the effects site-specific, local, or even regional?), duration (are the effects short or long-term?), and intensity (are the effects negligible, minor, moderate, or major?). The thresholds of change for the intensity of an impact are defined as follows:

Negligible: the impact is at the lowest levels of detection -barely perceptible and not measurable.

Minor: the impact is slight, but detectable. For archeological resources, the impact affects an archeological site(s) with modest data potential and no significant ties to a living community's cultural identity .The impact does not affect the character defining features of a National Register of Historic Places eligible or listed cultural landscape.

Moderate: the impact is readily apparent. For archeological resources, the impact affects an archeological site(s) with high data potential and no significant ties to a living community's cultural identity .For a National Register eligible or listed cultural landscape, the impact changes a character defining feature(s) of the landscape but does not diminish the integrity of the resource to the extent that its National Register eligibility is jeopardized.

Major: the impact is severe or of exceptional benefit. For archeological resources, the impact affects an archeological site(s) with exceptional data potential or that has significant ties to a living community's cultural identity .For a National Register eligible or listed cultural landscape, the impact changes a character defining feature(s) of the landscape, diminishing the integrity of the resource to the extent that it is no longer eligible to be listed in the National Register.

Cumulative Impacts: The Council on Environmental Quality (CEQ) regulations, which implement the National Environmental Policy Act, require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts are considered for both the no-action and preferred alternatives.

Cumulative impacts were determined by combining the impacts of the preferred alternative -replacing" Jim Camp Wash bridge, providing a raised sidewalk on the replacement bridge, widening the highway approach lanes to the replacement bridge, and converting Long Logs road into a foot trail -with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects within the Rainbow Forest area and, if applicable, the park and surrounding region.

Petrified Forest National Park is currently in the initial stages of revising its 1992 General Management Plan. The following table identifies proposals associated with implementing the park's General Management Plan that are still considered to be reasonably foreseeable future actions :

Table 5, Reasonably Foreseeable Future Actions -Petrified Forest National Park

Vicinity of Rainbow Forest Area	Vicinity of Painted Desert & Puerco River Valley
<ul style="list-style-type: none"> Rehabilitate visitor center Construct new trails, wayside exhibits, picnic areas, and comfort stations 	<ul style="list-style-type: none"> Construct new trails, pullouts, wayside exhibits, picnic areas, and comfort stations Replace NPS and concessionaire employee housing

Impacts to Cultural Resources and Section 106 of the National Historic Preservation Act: In this environmental assessment, impacts to archeological resources and the cultural landscape (Rainbow Forest designed historic landscape) are described in terms of type, context, duration, and intensity, as described above, which is consistent with the regulations of the Council on Environmental Quality (CEQ) that implement the National Environmental Policy Act (NEPA); These impact analyses are intended, however, to comply with the requirements of both NEPA and Section 106 of the National Historic Preservation Act (NHPA). In accordance with the Advisory Council on Historic Preservation's regulations implementing Section 106 of the NHPA (36 CFR Part 800, Protection of Historic Properties), impacts to archeological resources and the cultural landscape were identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that were either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the National Register; and (4) considering ways to avoid, minimize or mitigate adverse effects.

Under the Advisory Council's regulations a determination of either adverse effect or no adverse effect must also be made for affected cultural resources. An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualify it for inclusion in the National Register, e.g. diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects caused by the preferred alternative that would occur later in time, be farther removed in distance or be cumulative (36 CFR Part 800.5, Assessment of Adverse Effects). A determination of no adverse effect means there is an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the National Register.

CEQ regulations and the National Park Service's Conservation Planning, Environmental Impact Analysis and Decision-making (DO-12) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, e.g. reducing the intensity of an impact from major to moderate or minor. Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by Section 106 is similarly reduced. Although adverse effects under Section 106 may be mitigated, the effect remains adverse. A Section 106 summary is included in the impact analysis sections for archeological resources and the cultural landscape under the preferred alternative. The Section 106 Summary is intended to meet the requirements of Section 106 and is an assessment of the effect of the undertaking (implementation of the alternative) on cultural resources, based upon the criterion of effect and criteria of adverse effect found in the Advisory Council's regulations.

ENVIRONMENTAL CONSEQUENCES -AL TERNATIVE A (NO ACTION)

There would be no new impacts to geology and soils, air quality or biotic communities as a result of the noaction alternative.

Jim Camp Wash bridge would continue to deteriorate. Eventually the bridge would need to be demolished and replaced, which would have a moderate, adverse effect on the National Register eligible Rainbow Forest Historic Landscape. In accordance with Section 106 of the National Historic Preservation Act, the Arizona state historic preservation office would be consulted prior to bridge's demolition, to determine the level of recordation necessary to ensure that the bridge is adequately documented and to establish appropriate design guidelines for the replacement bridge.

Continued vehicular access to Long Logs would not reduce the theft of petrified wood from the area. This long-term problem has a moderate, adverse impact upon the park's paleontological resources, particularly the park's primary resource -petrified wood. In addition, there would not be a reduction in the number of visitors going to the Agate House. As a result, the site would remain more vulnerable to inadvertent disturbance and vandalism, which would result in long-term, minor to moderate adverse impacts upon the site.

Possible implementation of load restrictions on the bridge or its eventual closing would result in short-term, moderate impacts to visitor use and park operations. Because the bridge is on the main park road, if either load limits were placed on the bridge or the bridge was condemned and closed, there would not be an alternate means of traversing the linear park. Visitors and park personnel at the north or south ends of the park would be required to make about a 45-mile detour to access the opposite end of the park. This inconvenience would probably deter some visitors from visiting the opposite end of park. The failure or unplanned closure of the bridge would result in short-term, moderate, adverse impacts to visitor use and experience and park operations.

Failure or the unplanned closure of Jim Camp Wash bridge would impact the concessionaire, who operates the gift shop and snack bar at Rainbow Forest, as well as the two businesses near the park's south entrance. There would be a reduction in visitation and business would decline over the short-term, a moderate adverse impact until the bridge could be replaced and traffic flow restored from one end of the park to the other.

Cumulative Impacts: There would be no new cumulative impacts to geology and soils; air quality; or biotic communities. Past development has contributed to the loss of paleontological resources throughout Petrified Forest National Park. Reasonably foreseeable future actions, such as constructing new trails, pullouts, wayside exhibits, and comfort stations, have the potential to disturb unknown fossil deposits, but future development would be located so as to not impact the park's known petrified wood and paleontological sites. However, continued vehicular access to Long Logs would not reduce the theft of petrified wood, a nonrenewable resource, from the Rainbow Forest area. The cumulative effect of the no-action alternative on the park's petrified wood, in combination with other past, present, and reasonably foreseeable future actions, would be adverse and of moderate intensity .

Conclusion: The Jim Camp Wash bridge would continue to deteriorate and its eventual demolition and replacement would result in a moderate, adverse impact to the National Register eligible Rainbow Forest Historic Landscape. The Agate House would remain more vulnerable to the adverse impacts of inadvertent disturbance and vandalism. Long-term, moderate impacts to paleontological resources at Long Logs would continue unabated. The failure or unplanned closure of the bridge would result in short-term, moderate impacts to visitor use and park operations, as well as to the concessionaire who operates the gift shop and snack bar. The cumulative effect of the no-action alternative on the park's petrified wood, in combination with other past, present, and reasonably foreseeable future actions, would be adverse and of moderate intensity.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Petrified Forest National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

ENVIRONMENTAL CONSEQUENCES -ALTERNATIVE B (PREFERRED ALTERNATIVE)

Geology and Soils: Implementation of the preferred alternative would not impact any unique or important geologic features. Most of the project area would be returned to pre-disturbance grades and existing topography and elevations would not be appreciably altered.

Soils within the project area would be compacted and trampled by the presence of construction equipment and workers. In some areas soils are already impacted to a degree by various human and natural activities. Construction would take advantage of these previously disturbed areas wherever possible, for use as staging and stockpiling sites. Local soil compaction would temporarily decrease permeability, alter soil moisture, and diminish the water storage capacity of what are generally xeric soils; however, soil impacts overall would be adverse and minor to moderate in intensity but short-term, lasting only as long as construction.

Cumulative Impacts: Unique or important geologic features of Petrified Forest National Park have not been appreciably altered as a result of past development. The preferred alternative would have no impacts upon such geologic features. Reasonably foreseeable future actions associated with implementation of the 1992 General Management Plan, such as constructing new trails, pullouts, wayside exhibits, and comfort stations, would be sited to also not impact unique or important geological features. Because the preferred alternative would not impact any unique or important geologic features, it would not contribute to the impacts of other past, present, and reasonably foreseeable future actions. Therefore, there would be no cumulative impacts to geology resulting from the preferred alternative.

Past and present development have contributed to increased soil erosion and compaction, and the Rainbow Forest area has experienced a net loss of native soil over the past decades due to localized erosion, compaction, and weathering. Reasonably foreseeable future actions, such as constructing new trails, pullouts, wayside exhibits, and comfort stations, have the potential to produce further soil disturbance and contribute to erosion whenever undeveloped slopes are graded and soils are exposed. The impacts upon soils would be adverse and range in intensity from minor to moderate, depending upon both the scope of the potential actions and the location. Soil loss associated with both the preferred alternative and future actions would be lessened by requirements to provide ground cover and other erosion controls during and after construction. The cumulative effect of the preferred alternative on the park's soils, in combination with other past, present, and reasonably foreseeable future actions, would be adverse and range in intensity from minor to moderate.

Conclusion: There would be no impacts to unique or important geologic features. Soil impacts overall would be adverse and minor to moderate intensity but short-term. The cumulative effect of the preferred alternative on the park's soils, in combination with other past, present, and reasonably foreseeable future actions, would be adverse and range in intensity from minor to moderate.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Petrified Forest National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

Paleontological Resources: The preferred alternative would have no impact upon Triassic rock exposures. Because the actions proposed would occur entirely on previously disturbed land, there would be no impacts to known fossil

deposits. If during construction fossils are discovered, all work in the immediate vicinity of the discovery would be halted until an appropriate mitigation strategy could be developed.

Eliminating vehicular access to Long Logs would significantly reduce the theft of petrified wood from the area. Petrified wood at Long Logs would be better protected without closing the area to the public or instituting other restrictive measures. There would be a long-term, moderate to major beneficial impact to the paleontological resources (petrified wood) of the Rainbow Forest area.

Cumulative Impacts: Past and present development have contributed to the loss of fossils throughout Petrified Forest National Park. Reasonably foreseeable future actions, such as constructing new trails, pullouts, wayside exhibits, and comfort stations, have the potential to disturb unknown fossil deposits. The impacts upon such paleontological resources could be adverse and range in intensity from minor to moderate, depending upon both the scope of the potential actions and the location. Because the preferred alternative would not impact any known fossil deposits, it would not contribute to the impacts of other past, present, and reasonably foreseeable future actions. Therefore, there would be no cumulative impacts to such paleontological resources resulting from the preferred alternative.

Past development at Petrified Forest National Park has also contributed to the loss of petrified wood, but present and reasonably foreseeable future development associated with implementation of the 1992 General Management Plan would continue to be located so as to not impact the park's petrified wood deposits. However, park-wide petrified wood losses resulting from theft and/or displacement have been estimated to be as much as 10-12 tons per year, and petrified wood losses throughout the park continue despite the park's interpretive and resource protection emphasis on leaving the petrified wood, a nonrenewable resource, on the ground. Because reasonably foreseeable future development would be located so as to not impact the park's petrified wood deposits and vehicular access to Long Logs would be eliminated, which would significantly reduce the theft of petrified wood from the area, the cumulative effect of the preferred alternative on the park's petrified wood, in combination with other present, and reasonably foreseeable future actions, would be beneficial and range in intensity from minor to moderate. Because petrified wood losses at Long Logs threaten one of the park's more pristine petrified wood sites, the beneficial impacts of the preferred alternative would be an important component of the overall cumulative impact.

Conclusion: There would be no impacts to Triassic rock exposures or known fossil deposits. There would be a long-term, moderate to major beneficial impact upon the paleontological resources (petrified wood) of the Rainbow Forest area. The cumulative effect of the preferred alternative on the park's petrified wood, in combination with other present, and reasonably foreseeable future actions, would be beneficial and range in intensity from minor to moderate.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Petrified Forest National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

Air Quality: Should the preferred alternative be selected, local air quality would be temporarily affected by dust and construction vehicle emissions. Hauling material and operating equipment during the construction period would result in increased vehicle exhaust and emissions. Hydrocarbons, NOx, and 502 emissions would be rapidly dissipated by air drainage because air stagnation is rare at the projectsite.

Fugitive dust plumes from construction equipment would intermittently increase airborne particulates in the area near the project site. To partially mitigate these effects, such activity would be coupled with water sprinkling to reduce dust.

Cumulative Impacts: Air quality in Petrified Forest National Park is affected by a variety of internal and external air pollution sources. Internal air pollution primarily originates from such sources as vehicle emissions, furnaces, and boilers, and is influenced by a variety of factors such as humidity, precipitation, and temperature inversions. Air pollution generated by vehicle emissions, furnaces, and boilers, which would be unaffected by the preferred alternative and any of the reasonably foreseeable future actions associated with implementation of the 1992 General Management Plan, would exist into the future with anticipated emission levels remaining relatively similar to existing levels.

External pollution sources are primarily sulfates, which contribute foremost to the haze at the park. These pollutants are carried into the park from major industrial centers to the south and west and from power plants to the north and west. The long distance transport of pollutants, which would be unaffected by the preferred alternative and any of the reasonably foreseeable future actions, would exist into the future with anticipated emission levels remaining relatively similar to existing levels.

Construction and demolition emissions associated with any of the reasonably foreseeable future actions, such as constructing new trails, pullouts, wayside exhibits, and comfort stations, may be coincident with emissions generated by construction associated with the preferred alternative. However, air emissions associated with construction and demolition projects would occur once and would be generated over a relatively short-term period. Such impacts to air quality would be short-term, lasting only as long as the construction, and minor. The short-term, minor adverse effects associated with the preferred alternative, in conjunction with the effects of the reasonably foreseeable actions described above, would result negligible to minor cumulative effects. The intensity of effects would depend upon the number of construction activities, as well as whether or not multiple construction activities occur simultaneously. I but the park's Class I air quality designation would not be affected.

Conclusion: Overall, there would be a minor, short-term degradation of local air quality due to dust generated from construction activities and emissions from construction equipment. These effects would last only as long as the construction, and the park's Class I air quality would not be affected. The short-term, minor adverse effects associated with the preferred alternative, in conjunction with the effects of other reasonably foreseeable actions, would result negligible to minor cumulative effects.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Petrified Forest National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

Biotic Communities: Impacts to vegetation associated with construction activities would include the minimal clearing of vegetation, as well as the compacting of vegetation by construction equipment, stored materials, or temporarily displaced soil. Construction would take advantage of previously disturbed areas for use as staging and stockpiling sites.

Revegetation of approximately two acres of disturbed ground, using both seed previously collected from the project area and commercial seed that meets strict National Park Service guidelines for importation of seed, would begin shortly after construction activities are complete. Revegetation efforts would be directed to reconstructing the natural spacing, abundance, and diversity of native plant species. The principal goal would be to restore all disturbed areas as nearly as possible to pre-construction conditions. As a result, the effect of construction activities on vegetation would be minor and adverse but short-term.

During construction there would be a temporary disturbance and displacement of wildlife. The surrounding land, however, would continue to provide abundant nesting, escape, and protective cover. Some small animals may be killed or forced to relocate to areas outside the project area, but this would not be expected to have any long-term

adverse effect upon local populations. Wildlife would be expected to reoccupy the project area following construction. Thus, the effect of construction activities on wildlife would be minor and adverse but short-term.

Cumulative Impacts: As Petrified Forest National Park developed over the past decades, native vegetation was removed to make room for park and concession facilities, residences, and infrastructure. The primary effects on vegetation were short-term impacts to vegetation communities, long-term vegetation loss, and loss of both the occurrence and natural frequency of the natural processes that some species depend upon.

Reasonably foreseeable future actions, such as constructing new trails, pullouts, wayside exhibits, and comfort stations, have the potential to result in the loss of vegetation throughout the park. The preferred alternative, to replace the Jim Camp Wash bridge on its existing alignment rather than on undisturbed land either upstream or downstream, would minimize both the removal and disturbance of native vegetation, resulting in minor, adverse impacts to the Rainbow Forest area's vegetative communities. The minor adverse impacts of the preferred alternative, in conjunction with the adverse impacts of other reasonably foreseeable future actions, would result in adverse cumulative impacts to vegetation ranging in intensity from minor to moderate.

Incremental development at Petrified Forest National Park over the past decades has also affected the abundance and diversity of wildlife by changing the capacity of habitats to provide necessary food, shelter, and reproduction sites. The amount of open space throughout the park has been reduced by the construction of park and concession facilities, residences, and infrastructure. Wildlife is more restricted by current land uses, the density of development, and human activity than when the area was first occupied.

Some reasonably foreseeable future actions, such as constructing pullouts, wayside exhibits, picnic shelters, and comfort stations, would be limited in scope and occur in or adjacent to previously disturbed areas where habitat loss would be minimal. Although noise and human activity would likely disturb and possibly disperse wildlife during construction, such actions would probably have minimal adverse effects on wildlife. Adverse impacts to wildlife from such actions would also be minor due to current levels of disturbance or human activity at these sites and the localized nature of the effects.

Other reasonably foreseeable actions that are larger in scope, such as constructing trails, would be anticipated to have adverse impacts ranging in intensity from minor to moderate, depending upon the location of the trails. Potential impacts would include short-term habitat degradation due to noise and human activity during construction and potential long-term habitat fragmentation and loss.

The construction associated with the preferred alternative would occur predominantly on previously disturbed land that provides minimal wildlife habitat, rather than on undisturbed land, which would minimize both the short-term disturbance of wildlife and further encroachment on habitat linkages throughout the park. As a result, impacts to wildlife associated with the preferred alternative would be adverse but minor. The minor adverse impacts of the preferred alternative, in conjunction with the adverse impacts of other reasonably foreseeable future actions, would result in adverse cumulative impacts to wildlife ranging in intensity from minor to moderate.

Conclusion: The overall effect of construction activities on biotic communities -vegetation and wildlife communities - would be minor and adverse but short-term. The minor adverse impacts of the preferred alternative, in conjunction with the adverse impacts of other reasonably foreseeable future actions, would result in adverse cumulative impacts to biotic communities ranging in intensity from minor to moderate.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Petrified Forest National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

Archeological Resources: Construction would have no effect, either direct or indirect, on the known archeological resources in the vicinity of the project area. If during construction previously undiscovered archeological resources are discovered, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and an appropriate mitigation strategy developed in consultation with the state historic preservation officer. Transforming Long Logs road into a foot trail would reduce the number of visitors going to the Agate House. Incidences of inadvertent disturbance and vandalism would decrease, resulting in a long-term, minor to moderate beneficial impact to the Agate House.

Cumulative Impacts: Archeological resources at Petrified Forest National Park are subject to damage from development, vandalism, visitor access, and natural processes. Past development in the park has resulted in the disturbance and loss of some archeological resources during excavation and construction activities. Many of the reasonably foreseeable future actions at the park, such as constructing new trails, pullouts, wayside exhibits, and comfort stations, could also disturb archeological resources. If significant archeological resources could not be avoided, the data they possess regarding prehistoric and/or historic lifeways would be documented and recovered, in consultation with the Arizona state historic preservation office. The impacts to such archeological resources would be adverse and range in intensity from minor to major, depending upon both the scope of the potential actions and the location. Because the preferred alternative would not impact any known archeological resources, it would not contribute to the impacts of other past, present, and reasonably foreseeable future actions. Therefore, there would be no construction related cumulative impacts to archeological resources resulting from the preferred alternative.

Converting Long Logs road into a foot trail would reduce the incidences of inadvertent disturbance and vandalism to the Agate House. Because reasonably foreseeable future development would not impact the Agate House, the cumulative effect of the preferred alternative on the Agate House, in combination with other present and reasonably foreseeable future actions, would be beneficial and range in intensity from minor to moderate.

Section 106 Summary: After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR Part 800.5, Assessment of Adverse Effects), the National Park Service concludes that implementation of the preferred alternative would have no adverse effect on the Rainbow Forest area's known archeological resources.

Conclusion: There would be no construction related impacts to known archeological resources. There would be a long-term, minor to moderate beneficial impact to the Agate House. Under Section 106 of the National Historic Preservation Act, implementation of the preferred alternative would have no adverse effect on the Rainbow Forest area's known archeological resources.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Petrified Forest National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

Cultural Landscapes: There is a balance between change and continuity in cultural landscapes resulting from both natural processes and human activities. The dynamic quality of change, however, can be balanced by the continuity of distinctive characteristics, or character defining features, retained over time, which maintains continuity of form, order, use, features, or materials. The proposed alternative acknowledges the need to alter or add to cultural landscape to meet new uses while retaining the landscape's historic character.

A number of historic landscape elements (Jim Camp Wash bridge, curbing, rock walls, Long Logs road and parking area) would be removed. In addition, there would be a long-term change in scale and visual relationships among landscape features. The replacement bridge and approach lanes would be wider, which would increase the scale of developed landscape elements. Converting Long Logs road into a foot trail and the resultant reduction of pavement width, the addition to the entry gate, and the change to pedestrian circulation only in the Long Logs area would also alter the scale of development, as well as the historic type of use. However, retaining the historic alignment of the center line of the bridge with the flagpole and museum on the west side, as well as integrating the pedestrian bridge with the new vehicular bridge, are two design elements of the preferred alternative that would mitigate the overall impact of the proposal.

Implementing the preferred alternative would result in a long-term, moderate adverse impact to the Rainbow Forest Historic Landscape. There would be an overall reduction of historic integrity in the Rainbow Forest Historic Landscape, but not to the extent that the landscape would no longer be eligible to be listed in the National Register of Historic Places. The intensity of the adverse impact would be moderate because (1) the primary, original design elements of the landscape (see list, pages 11-12) would remain intact, especially with regard to retaining the historic alignment of the center line of the replacement bridge with the flagpole and museum on the west side; (2) the replacement bridge would be visually compatible to the original bridge and its surroundings, i.e. similar in scale, massing and materials, color and texture, and orientation; and (3) all historic structures and landscape elements slated for removal would be documented to the standards of the Historic American Engineering Record prior to construction. In addition, leaving the former Long Logs road prism intact and preserving the existing culverts, as well as retaining much of the rock walls and curbing at the former Long Logs parking area, would enable the park to interpret and visitors to better visualize how the Long Logs area once appeared and functioned.

Cumulative Impacts: Various alterations to the Rainbow Forest Historic Landscape have occurred over the years since National Park Service/Civilian Conservation Corps (CCC) construction. In the main parking/museum/concessions area, roadways have been blocked off, curbing replaced, new picnic facilities added, parking circulation altered, and modern facades added to the concessions building. At Long Logs, sections of wall and the overlook shelter have been added, and curbing replaced. Because the primary, original design elements (see list, pages 11-12) of the Rainbow Forest Historic Landscape are still intact, the landscape is still considered to be National Register eligible. However, any future alterations of the landscape, in conjunction with the adverse, cumulative impacts of both past changes and the preferred alternative, would bring the integrity of the landscape as a whole (especially design, materials and workmanship) down to the level where National Register eligibility would be questioned. Therefore, the long-term, moderate, adverse impacts of the preferred alternative, in conjunction with past adverse impacts and, most importantly, any potential impacts of future actions, could result in major, adverse cumulative impacts to the Rainbow Forest Historic Landscape.

Rainbow Forest is one of three areas in Petrified Forest National Park that represent early park developments involving New Deal Era work project groups, including the CCC. The other two are the Painted Desert Inn landscape and the Puerco landscape. The Painted Desert Inn landscape is potentially eligible to be listed in the National Register due to the fact that the Inn itself is a national historic landmark; however, the landscape has yet to be evaluated. A cultural landscape inventory completed for the Puerco landscape (which includes the sites of two CCC camps) has determined that this landscape is not eligible as a historic designed/vernacular landscape due to low integrity; it is, however, potentially eligible as an archeological landscape. Thus, reduction in integrity within the Rainbow Forest Historic Landscape is an important consideration within the overall context of the park.

Section 106 Summary: After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR Part 800.5, *Assessment of Adverse Effects*), the National Park Service determines that implementation of the preferred alternative would have an *adverse effect* on the Rainbow Forest Historic Landscape, which is considered eligible to be listed in the National Register of Historic Places. A memorandum of agreement, in accordance with 36 CFR Part 800.6[c], *Resolution of Adverse Effects Memorandum of Agreement*, would be executed and implemented between Petrified Forest National Park and the Arizona state historic preservation officer (and/or the Advisory Council on Historic Preservation, if necessary). The memorandum of agreement would stipulate how the adverse effects would be addressed, e.g. all affected historic structures and landscape elements would be documented to the standards of the Historic American Engineering Record prior to construction (including drawings and sketch plans, photographs with large format negatives, and brief narrative histories of affected structures recorded on architectural data forms).

Conclusion: The preferred alternative would have a long-term, moderate, adverse impact upon the Rainbow Forest Historic Landscape. There would be an overall reduction of historic integrity in the landscape, but not to the extent that it would no longer be eligible to be listed in the National Register of Historic Places. Any future alterations of the landscape, in conjunction with the adverse, cumulative impacts of the previous changes and the preferred alternative, could result in major, adverse cumulative impacts to the Rainbow Forest Historic Landscape. Under Section 106 of the National Historic Preservation Act, implementation of the preferred alternative would have an *adverse effect* on the Rainbow Forest Historic Landscape.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Petrified Forest National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

Visitor Use and Experience: While the Jim Camp Wash bridge is being replaced, vehicular traffic along the main park road would be temporarily restricted in the vicinity of the Rainbow Forest area. Traffic would be subjected to alternating, one-way flow at the bridge, and would be regulated by a lighted traffic system. Every effort, however, would be made to maintain the flow of vehicular traffic on the main park road during the construction period. Flaggers could also be used during work hours to control traffic. Any construction associated delays would normally be limited to 30-minutes or less. Visitors caught in the delays would be frustrated and may consider the delays interminable. Due to unforeseen circumstances, closure of the bridge may be necessary but efforts would be made to prevent and/or minimize full closures. All efforts would be made to reduce delays and closures as much as possible and to alert park staff as soon as possible if delays longer than normal or closures are expected. Visitors stopping at the park's two visitor orientation areas would be informed of construction activities and associated delays. Equipment would not be stored along the roadway overnight without prior approval of park staff. In addition, construction would occur during the off-season winter months when visitation is lower, which would further minimize impacts to visitor use. Impacts would be adverse and range in intensity from minor to moderate, but would be short-term in duration.

Construction would also introduce visual, audible, and atmospheric intrusions into the setting of the Rainbow Forest area, which could reduce the quality of the visitor experience during the construction period. In addition, staging and stockpiling for the project would occur on the parking area in the Rainbow Forest developed area, near the picnic shelters. Fewer available parking spaces could inconvenience visitors. Such intrusions and inconveniences, however, would occur during the park's off-season, when visitation is lower. In addition, such impacts would be localized and temporary, lasting only as long as construction. Overall, construction related impacts to visitor use and experience would be minor and adverse but short-term.

Replacing the deteriorating Jim Camp Wash bridge and widening the approach lanes would have a longterm, moderate beneficial impact upon visitor use and experience. Not only would there be a safe and reliable entrance to the Rainbow Forest visitor area but the raised sidewalk separating vehicular and pedestrian traffic on the bridge would enhance visitor safety , allowing visitors to more safely cross the bridge to access the trail to Long Logs.

Visitors unable to access Long Logs and Agate House as a result of eliminating vehicular access to the area would still be able to access other petrified wood sites in the park, as well as the park's two visitor centers and museum, to observe the colors and texture of petrified wood up close and learn about the Agate House. Such visitors may express disappointment at not being able to drive to Long Logs, but most would understand the greater need of better protecting the petrified wood -a nonrenewable resource. Closing Long Logs road and constructing a new access trail to the area would have long-term, minor to moderate adverse impacts upon visitors unable or unwilling to walk to the sites. However, other visitors, who enjoy longer hikes than currently provided in the park, may perceive the closure as beneficial. For such visitors, closure of Long Logs road would result in a long-term, minor to moderate, beneficial impact. Thus, the adverse effects of eliminating vehicular access to Long Logs may be somewhat offset by the beneficial effects of a longer trail experience for hikers.

Cumulative Impacts: Construction associated with reasonably foreseeable future actions, such as constructing new trails, pullouts, wayside exhibits, and comfort stations, may be coincident with construction associated with the preferred alternative. Construction vehicles could cause congestion along the park road. Such congestion would impact all visitors regardless of travel mode, because private vehicles and tour buses share the same roadways. Such impacts would temporarily reduce the quality of experience for visitors. The impacts associated with each individual project would generally be short-term and minor, lasting only as long as construction. However, the cumulative intensity of such impacts could be magnified by the number of construction activities occurring simultaneously. The short-term, minor adverse impacts of the preferred alternative, in conjunction with adverse impacts of other reasonably foreseeable future actions, could result in adverse cumulative impacts to visitor use ranging in intensity from minor to moderate.

Although closing Long Logs road and constructing a new access trail to the area would have long-term, minor adverse impacts upon visitor use and experience, other aspects of the preferred alternative, as well as many reasonably foreseeable future actions, would result in beneficial impacts to visitor use and experience. Constructing the proposed trails, pullouts, wayside exhibits, picnic areas, and comfort stations would have minor to moderate, beneficial impacts upon visitors by reducing traffic and crowding and providing more interpretive and educational opportunities for park visitors. The minor to moderate beneficial impacts of the preferred alternative, in conjunction with the beneficial impacts of other reasonably foreseeable future actions, would result in overall beneficial cumulative impacts to visitor use ranging in intensity from minor to moderate.

Conclusion: Overall, construction related impacts to visitor use and experience would be minor and adverse but short-term. Replacing the deteriorating Jim Camp Wash bridge and widening the approach lanes would have a long-term, moderate beneficial impact upon visitor use and experience. Closing Long Logs road and constructing a new access trail to the area would result in long-term, minor to moderate adverse impacts to visitors unable or unwilling to walk Long Logs or the Agate House. Other visitors, seeking a longer hike than currently available in the park, may perceive the closure as a long-term, minor to moderate, beneficial impact.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Petrified Forest National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

Park Operations: The expenditure of money and time associated with maintenance of the new bridge, as compared to that required currently for Jim Camp Wash bridge, would be reduced from monthly and/or yearly expenditures to multi-year general maintenance and upkeep. The costs associated with removing accumulated sand from the bridge roadbed would be eliminated. Thus, replacement of the bridge would have long-term, minor to moderate beneficial impacts upon park operations.

The preferred alternative would also result in increased protection for the area's petrified wood with no corresponding increase in the park's current level of staffing. Current park staffing makes it impossible to consistently have a daily uniformed presence at Long Logs during operating hours, when vehicular access of Long Logs is permitted, to prevent the theft of petrified wood. Eliminating vehicular access to the site, however, would result in a reduction of wood theft without increasing the park's staffing requirements, resulting in long-term, minor beneficial impact to park operations.

Cumulative Impacts: Several reasonably foreseeable future actions at Petrified Forest National Park, such as constructing new trails, pullouts, wayside exhibits, picnic areas, and comfort stations, could result in long-term, minor to moderate increases in the workloads of the park's maintenance and resource management personnel, due to increased needs for maintenance and resource monitoring and protection. However, the minor to moderate beneficial impacts of the preferred alternative would somewhat offset adverse impacts associated with any of the reasonably foreseeable future actions.

Conclusion: Implementation of the preferred alternative would result in long-term, minor to moderate beneficial impacts to park operations. The minor to moderate beneficial impacts of the preferred alternative would partially offset adverse impacts associated with any of the reasonably foreseeable future actions.

Socioeconomic Environment: The concessionaire who operates the gift shop and snack bar and the two businesses near the park's south entrance would not experience a downturn in visitation and business that would be associated with the failure or unplanned closure of Jim Camp Wash bridge. Because traffic flow from one end of the park to the other would be impeded but not interrupted during the bridge replacement, any construction related economic impacts would be adverse but negligible to minor in intensity and short-term.

Implementation of the preferred alternative could provide a minor beneficial impact to the economies of Holbrook, which is 23 miles west of the park headquarters and 19 miles west of the southern park entrance, as well as Navajo and Apache counties, e.g. an increase in employment opportunities for the construction workforce and a modest increase in revenues for local businesses and government generated from construction activities and workers. Any increase, however, would be minor and beneficial but temporary, lasting only as long as construction.

Cumulative Impacts: Construction associated with reasonably foreseeable future actions, such as constructing new trails, pullouts, wayside exhibits, and comfort stations, may be coincident with the construction associated with the preferred alternative. Visitors in the park may experience construction related delays along the park road or inconveniences in the visitor areas of Painted Desert and the Rainbow Forest, where the concessionaire's facilities are located. Construction related delays or inconveniences affecting visitors may also adversely effect the concessionaire and the two businesses near the park's south entrance, but any such cumulative impacts would be short-term and minor.

Converting Long Logs road into a trail and other reasonably foreseeable future actions, such as constructing new trails, pullouts, wayside exhibits, and comfort stations, could encourage visitors to stay in the park or local area longer. This could result in a minimal increase in visitor expenditures, both in the park at the concessionaire's facilities and locally in Holbrook, which would result in a minor, long-term, cumulatively beneficial impact upon the local economy.

The preferred alternative, as well as other reasonably foreseeable future actions identified in the 1992 General Management Plan, could also provide a minimal beneficial impact to the local economy through increased employment opportunities for the local construction workforce, as well as a modest increase in revenues for local businesses and government generated from construction activities and workers. Any increases, however, would be temporary, lasting only as long as construction, and minor.

Conclusion: Impacts to the socioeconomic environment associated with construction activities, whether adverse or beneficial, would be short-term and minor. Implementation of the preferred alternative could result in minimally increased visitor expenditures in Petrified Forest National Park, as well as locally in Holbrook, which would result in a minor, long-term, cumulatively beneficial impact upon the local economy.

CONSULTATION AND COORDINATION

AGENCIES AND ORGANIZATIONS

Organizations and agencies contacted for information; or that assisted in identifying important issues, developing alternatives, or analyzing impacts; or that will review and comment upon the environmental assessment include:

Federal Agencies

U.S. Army Corps of Engineers
U.S. Department of Agriculture -Natural Resources Conservation Service
U.S. Department of the Interior -Fish and Wildlife Service, Phoenix Office
U.S. Department of Transportation -Federal Highways Administration

State Agencies

Arizona Department of Environmental Quality
Arizona Game & Fish Department -Habitat Branch
Arizona State Parks -State Historic Preservation Office

Native American Groups Hopi Tribe

Navajo Nation
Zuni Pueblo
White Mountain Apache

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Federal Highway Administration

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LIST OF ENVIRONMENTAL ASSESSMENT RECIPIENTS

The following agencies, organizations, and groups were sent copies of the Environmental Assessment:

Federal Agencies

Advisory Council on Historic Preservation

U.S. Army Corps of Engineers

U.S. Department of Agriculture -Natural Resources Conservation Service

U.S. Department of the Interior -Fish and Wildlife Service, Phoenix Office

U.S. Department of the Interior -Geological Survey, Biological Resources Division, Colorado Plateau
Field Station, Flagstaff, Arizona

State Agencies

Arizona Department of Environmental Quality Arizona Game & Fish Department -Habitat Branch Arizona State Parks -

State Historic Preservation Office

Native American Groups Hopi Tribe

Navajo Nation

Zuni Pueblo

White Mountain Apache

Other Agencies and Organizations Apache County

City of Holbrook, Arizona

Grand Canyon Trust

Little Colorado River R, C & D

National Parks and Conservation Association Navajo County , Arizona

Navajo County Historical Society

White Mountain Audubon Society

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